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VOLUME 20 M NUMBER 8 AUGUST 2005

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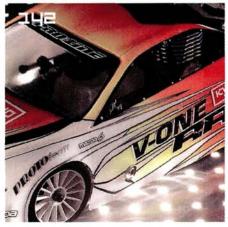
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car action

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COVER STAR: Kev's Project Revo wheelies into the wild blue yonder. Shot by Pete Hall











STARTINGLINE

Monster Racing Gets Real

If you've been checking in at rccaraction.com (or you skipped ahead to "Racer News"), you already know that the ROAR Off-Road Fuel Nationals included a monster truck class for the first time. That makes it official: monster truck racing is here to stay. Not that it hasn't been a huge blip on the radar for a while now. With dedicated events like the Pro-Line Maxx Challenge and RC Car Action Monster Madness race, and full grids of monsters at other big events such as the RC Pro Series, monster racing has been "for real" for a long time.

But when ROAR gives it the nod, it's like the

Olympics Committee recognizing mountain bike racing. You never doubted it was worthy, but it's good to see an official acknowledgment from on high.

What does this new acceptance mean for monster truck racing? More rules, most likely; and frankly, that's a good thing. If you've ever raced in the nitro monster class, you've probably experienced some loose rules with loopholes you could (ahem) drive a truck through. Truggies are almost certainly the future of the class, since so much has already been achieved with ½-scale buggy tech—bolting on bigger tires is a natural. Electric truck racing saw the same sort of evolution when converted RC10s and Losi JR-X buggies started to clobber the Tamiya Blackfoots and other play-oriented truck platforms. Today's racing trucks are much more than just buggies with big tires, and nitro truggies are quickly evolving beyond the big-tire conversion stage; consider the XTM Racing Mammoth ST (last month's "Scoop"), the GS Racing SUT, OFNA's anticipated Jammin' truggy and Mugen's new MBX-5T.

Exciting stuff, but I'm hoping there will still be a place (and clear rules) for high-riding, "real monster" racing. I'd be bummed if all the fresh-faced newcomers with RTR Savages, T-Maxxes and Monster GTs who decide to give racing a try quickly become discouraged when they realize they'll have to compete with fire-breathing, 3-horse truggies. If ROAR doesn't take care of these guys, I hope the local track operators will. Think about it!

In This Issue



RCX!

The annual Radio Control Expo (aka RCX) just wrapped, and it rocked. Tons of new gear debuted, and there was nonstop action with top pros on the dirt track, aerobatics in the Flight Zone and demos on the boat pond. Couldn't make it to Anaheim? All the action is right here.

RIPPIN' REVO

As I type this, Kevin Hetmanski has just unveiled his Project Revo. That bad boy's goin' on the cover! If that Cuda-bodied killer isn't the coolest race-Revo ever, I don't

know what is. And it's just as trick under the body! See for yourself on page 190.

BATTERY WARS

Senior technical editor Steve Pond answers all your burning questions about battery performance. He has cycled and tested (and, in some cases, blown up!) all the current sub-Cs to see which ones truly deliver. It's awesome, in-depth stuff!

See you in 30,

Peter Vieira

Executive Editor

car action

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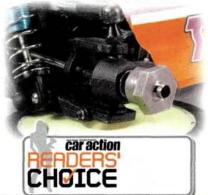


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READERSWRITE

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Polar Puzzled

Hey, I just got my latest issue, and I have a question about "polar moment" as explained in the Losi JRX-S review's "Science of Cornering" section. If concentrating mass is so important to handling, why do 2WD buggies and trucks have their motors hung off the back of the chassis? Shouldn't they be inboard? [email] Jay R.

Touring cars are uniquely qualified to benefit from an aggressive central-mass treatment because they have 4WD and a lot of grip, but a 2WD off-road vehicle works better with more weight transfer to the rear wheels, hence the rear-motor design. As with full-scale race cars, no single design theory can be applied to all RC race cars with equal results; it's an endless game of compromise.

-Pete

Go Wide!

First of all, great mag; I've been an avid reader for ages and still have issues that date back to the early '90s. I have an old Bolink Sport, and after scrounging for parts, I was able to get it running, sans body. I've tried eBay without any luck there, and my hobby shop says no one makes bodies in that width anymore. Do you know of a company that has or makes bodies that will fit this car? Please help! Spence Pickett Norcross, GA SwTSpncR@aol.com

I'm glad you let me print your email address, Spence, since I think your best bet for finding a body is a tip from one of our readers. Otherwise, a hobby shop with old stock is really your only chance. Failing that, try contacting Parma and Pro-Line; they don't usually go direct, but they might be willing to help out a guy with special circumstances like yours. Call Associated, too; it offered wide bodies back in the day, and who knows what's still in the warehouse!

—Pete

Rippin' Rustler

I would like suggestions on what I can do to make my Traxxas Rustler a better truck. I've already upgraded the motor to a Trinity Speed Gems 13-double, and I have Power Maxx batteries, so the question is not really about power. I also upgraded my shocks to XTM X-Cellerator front and rear shocks. I like to

jump my truck, and I

jump it hard. What can I do to the suspension to increase the wheel travel? Also, which gearing ratio will help my truck get the best performance and longest run times? My gearing is currently a 17-tooth pinion and a 78-tooth spur gear. [email]

Paul Matyn

There's plenty you can do to dress it up (think RPM wheels and arms, Pro-Line or Parma body and new tires), but I think you've reached the limits of Rustler performance already. For hardcore jumping, run stiffer springs and heavier shock fluid. As for gearing, try going to a larger spur gear; it generally isn't good to go below 17 teeth on any pinion because then the tooth spacing gets weird.

-Pete

Think Small

I'm halfway through the June '05 issue, and I just have one question regarding the Mini-T Pro project. In the list of parts used,



the transmitter shown is the XS3 Pro (a great choice, in my opinion—best one ever made), yet on the Mini-T, you show the RS300 receiver. Why didn't you use the RS310 that comes with the XS3 Pro? It's a smaller, more compact unit that still



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READERSWRITE

TRINITY.

has all the great features of the RS300. What was Kevin thinking? [email] Steve Welsh

We goofed; Kev actually has the standard XS3. He used to have a Pro, but I traded him a car for it. I actually gave him a Novak XXL to use instead, but he didn't want to give up the frequency-synthesizing ability.

—Pete

Who Cut the Silo?

In the May issue you have the Traxxas Jato on the cover. I loved this truck! I observed every detail and found something interesting—or funny. On the cover of the magazine, look at the Jato's right control arm and then look at the lower shock linkage. To me, it seems as if Traxxas forgot to install a screw for that shock; it doesn't look as if there's anything holding it at all. I just thought that was interesting to find; maybe it's just the angle of the shot. [email] Jason

I really look forward to your magazine coming out every month. I first picked up *RC Car Action* a year ago and have been hooked on the hobby since then. I noticed on the Traxxas Jato that's on the cover of the May issue that the right front shock looks as if it isn't attached to the A-arm. Am I missing something? [email] *Josh Swarts*

I can't believe how many of you caught

that! The Jato was complete when we shot the studio pic, but when the artist silhouetted the image to drop it over the background, he had a hard time distinguishing suspension parts from shadow and clipped out the screw that holds the shock on the suspension arm. So, we fired him, and now he's squeegeeing windows on the corner. Happy now?

—Pete

Lensman

I just wanted to let you guys know your mag is awesome, and I read it all the time. One thing I would like to know is what kind of cameras/lenses do you guys use to go out and do reviews of cars and most of all for races? It would be cool to let all the other photo geeks know what you guys use. Peace out. [email] Brad Schouten Green Bay, WI

Pete Hall and Jason Sams shoot most of the action; here's what they use:

Pete

Camera: digital, of course, Canon EOS-1 DS Favorite lens: Canon F-series 70-200 mm F2.8

Favorite shutter speed: sorry; trade secret Favorite athlete's foot cure: CVS brand

Jason says, "I use a Nikon D1X and all Nikon glass. Maybe my dreams will come true, and I'll be shooting with the new D2X by the time this is in print."

YOU SAID IT

I believe it is time for custom building to reach a new level

I'm responding to your June 2005
"Starting Line" topic, "Scratch That Niche."
My favorite niche in RC is, by far, the custom building of vehicles. I believe it's time for custom building to reach a new level.
Sure, highly modified monster trucks and other custom vehicles are cool to look at, but I feel that custom building should reach racing. Who says the large manufacturers are the only ones to have custom-built vehicles entered in races?
I'm not saying that just anybody should enter his own design against a Losi or an

Associated, but there should be a separate class for the custom vehicles. I'm sure there are racers out there who have great ideas that could eventually make it into production vehicles. How else can casual racers get their ideas out there if they don't build them and show everyone? The High Speed Challenge is a great step toward this goal, and I believe more events like that will make RC racing more exciting in all aspects. [email] Andy Spodick

A custom class would be pretty cool! And speaking of the World's Fastest RC Challenge: it's still gonna happen, we're just buttoning up the date and location.

--Pete



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Trinity awards the "You said it" letter writer the Reference body of his choice.
This is the Pro Nitro Racing Truck.

BY PAUL ONORATO

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YOUR BEST BUILDS



Mark Janeck > Campbellville, Ontario, Canada **Traxxas E-Maxx**

Mark's well-executed, modified Traxxas E-Maxx and cool pictures get him the nod for Reader's Ride of the Month. His truck is so loaded with aftermarket swag from many different manufacturers that it has been turned into one mean purple machine. It includes: a Gorilla Maxx chassis, motor mount and battery straps; Integy suspension arms, bulkheads, shock towers and a customized Savage wheelie bar; Hot Bodies aluminum, fluid-filled shocks; DuraTrax bumpers and skidplates; Barnburner alloy steering knuckles; Megatech bearing-supported steering bellcranks; MIP center CVDs; Dynamite CVD axles; a Robinson Racing slipper clutch; 14 GP3300 batteries; Hitec Lynx 3D radio and HS-645MG high-torque steering servo; Deans Ultra Plug battery connectors; RPM purple Monster Clawz StableMaxx wheels; and a Pro-Line Hummer H2 body. Sweet ride, Mark!

Clint Thelen > Omaha, NE HPI Sprint

Clint painted this sweet-looking HPI BMW M3 touring car body with color-changing paint. It rolls on HPI chrome wheels with X-pattern tires, and he upgraded the chassis with a DuraTrax 16T Mild Mod speed control, Trinity Chameleon Pro 2 19T motor, Airtronics radio and receiver and an HPI front one-way diff, urethane drive belts, steel universals and an adjustable tie-rod set.





Karl Osaki > Walnut, CA

Kyosho Inferno MP-7.5 Kanai Edition III

Karl is ready to take on anyone with his well-equipped Kanai III buggy. A JP Modified engine with its Fioroni turbo sliding clutch and Novarossi tuned pipe creates plenty of rip, and Fioroni center torque braces and an aftermarket chassis plate reinforce the chassis. He selected a KO Propo Helios radio system and Airtronics servos to control his ride and added an AMB personal transponder. Karl painted the Trinity Reference body using Pro-Line internal graphics, and Medial Pro Adheris tires provide off-road traction.



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If we feature your vehicle in Readers' Rides, you win a one-year subscription (or renewal) to RC Car Action. Reader's Ride of the Month wins a Novak battery pack, and Reader's Ride of the Year wins a Novak brushless motor system! Email your 300dpi TIFF or JPEG images to readersrides@airage.com, or send color printsand a description to Readers' Rides, RC Car Action, 100 East Ridge, Ridgefield, CT 06877-4606 USA. Be sure to write your name, address and phone number on the back of each photo and on your letter. Submissions will not be returned.



[READERS'RIDES]

Bob Leeper > Fort Wayne, IN Thunder Tiger EK-4

Inspired by the twin-engine T-Maxx he saw in the "Maxx Overdrive" column of the January issue, Bob decided to build the ultimate twin-engine monster truck. He took a stock Thunder Tiger EK-4 that was powered by a massive .70 engine and added a second Pro 70 engine. To get both engines to fit, he custom-built many parts, including a new, 4.7mm-thick, aluminum chassis, a throttle/brake bellcrank and an engine header. He also moved the driveline to the center of the chassis so the engines could sit



symmetrically on the chassis for a factory look. He admits that the EK-4 does not need more power, but he wanted a twin-engine MT like no other, and we are pretty sure he has it. Nice work!



Jeffrey Scott > Tumwater, WA Team Associated TC3 and Yokomo MR4TC

Jeffrey built these NASCAR look-alikes so that he and his neighbor can race each other. Under the Jeff Gordon no. 24 DuPont is an Associated TC3, and under the Scott Riggs no. 10 Valvoline is a Yokomo MR4TC. To keep the racing close, both cars use HPI stock-car wheels, Pro-Line sedan Hawg tires, Pro-Line Monte Carlo bodies and Peak Racing Jaguar motors.



Gary Perine > Deposit, NY FG Modellsport MT5

Heads up if you see Gary with his enormous (1/6-scale) FG Modellsport MT5 monster truck; it weighs in at just over 25 pounds and is powered by a Zenoah G260 gasoline engine. A Hitec digital giant-scale HS-5745MG servo that produces 250 oz.-in. of torque controls the steering for the giant truck, and two standard Hitec 5998TG servos handle the brakes and throttle control. Gary tells us that his truck easily spins the tires on pavement, hits speeds of more than 40mph and can run for nearly 30 minutes on one tank of fuel.





Andrew Moore > Oxford, England Tamiya TLT-1

Andrew is a big fan of rock crawling, and his latest work is this trick-looking Tamiya TLT-1. He designed the chassis, gearbox, transfer case, trailing links and mounts and then had them machined. A 40-turn airplane motor feeds power into a 3.9:1 in-line gearbox that drives a 3:1 transfer case; it, in turn, spins the modified Traxxas telescoping universals. His good friend, Rich Armstrong, painted and detailed the Nikko ½0-scale Jeep body, and the tires and wheels are from a Tamiya Wild Willy 2.



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VOUL TIP



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Power Stroke shock boot seal

The Pro-Line Power Stroke shocks have rubber boots installed to keep the shock shafts and seals clean. Unfortunately, the boots are not secured to the rod ends on the By-Pass shocks because they do not use springs or retainers. Use a small ziptie to secure the bottoms of the boots to the shock-shaft rod ends. The zip-tie will prevent the boot from slipping off the rod end.

Brandon Fipher > Trenton NJ Multiple car setups with one radio Most computer radio systems have multiple model memories for storing setups. You can also use the model-memory feature to store different setups for just one vehicle. For example, have one model profile setup for asphalt and another for racing on carpet. Offroad racers can store setups for a variety of surfaces.

PED TIP

ROAR-legal Triple-XNT AD1 tank

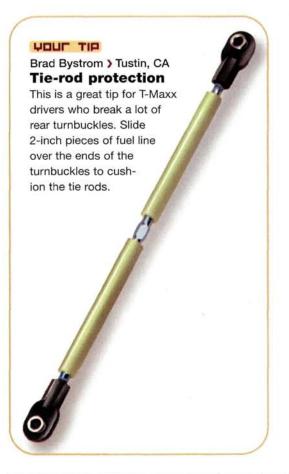
This tip comes from the Losi camp: the Triple-XNT AD1, RTR and RTR 2 have slightly oversize fuel tanks that aren't ROAR-legal. To bring a fuel tank down to 75cc capacity, put a 12-inch length of fuel line with its ends capped with 3mm screws into it.











Stay-put fuel line

If the fuel line on your nitro vehicle keeps slipping off the fuel-tank pick-up, double up the end of the fuel line. Slide a 3mm length of fuel line over the jaws of a pair of needle-nose pliers. Next, spread the piece of line, and slide it over the end of the fuel line that goes to the tank pick-up. The fuel line will be clamped into place.



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OFNA RTR. Email your tips to GeorgeG@airage.com. Include a photo, or scan a sketch if you can. Snail mail? Write to Pit Tips, 100 East Ridge, Ridgefield, CT 06877-4606 USA. Be sure to write your name, address and phone number on each tip you submit.





We screen all Pit Tips for functionality, feasibility and safety but do not test them. RC Car Action is not responsible if you mess up your gear or yourself by using the tips given here. If you aren't comfortable following any tip we show—DON'T!

TROUBLESHOOTING

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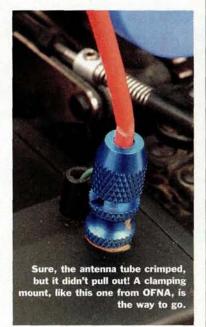
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Antenna won't stay put

I have a problem with my ½-scale buggy: the antenna keeps slipping out of the molded antenna holder on the radio box. I installed different-size antenna tubes and even tried to glue the antenna to the mount with CA. These fixes helped only temporarily; the antenna just won't stay put. I also tried drilling a hole in the mount to hold the antenna in place with a small screw. That didn't work either because the hole now is stripped from constantly tightening the screw. I'm running out of options. [email]

Jerry Miller

Install a clamping antenna mount on your buggy, Jerry. OFNA, Kyosho and GS Racing all offer an aluminum antenna mount that is designed to clamp down on the antenna tube to prevent it from falling off during hard running. You'll need to drill a small hole in the top of the radio box (next to the stock antenna mount) to secure the new mount with a screw. Pass the antenna wire through the stock antenna mount and then through the antenna. Place the antenna in the clamp, and tighten down the knurled collar. The antenna will stay in place no matter what.



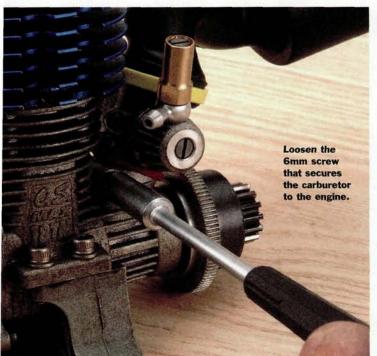
DUTCKOUESTION

Q: I'd like to install T-Maxx tires and wheels on my Genesis. How do I do it?

A: New Era Models offers 14mm hex adapters (item no. CGN450) for standard Maxx-type wheels, and CEN offers 23mm hex adapters that allow you to install Pro-Line 23mm hex rims (go to cenracing.com for more info).

Hard-to-reach idle screw

I recently installed an O.S. 18TM engine in my Revo because I wanted more power. The engine is awesome, but the idle-speed screw is very hard to reach, and that makes it nearly impossible to adjust idle speed when the engine is running. The engine is supposed to be a direct fit, so I was surprised that the idle screw is in such a tough-to-reach position. Is there anything I can do to improve the access to it? [email]



I installed the same engine in my Revo, and the idle screw is easy to access. Try to rotate the carburetor a few degrees counterclockwise. To reposition the carb, you'll have to loosen the 6mm nut that secures it to the engine. Ideally, the carb should be parallel with the tuned pipe. This should allow a straight path to the idle screw with a tuning screwdriver. Also be sure that the tuned-pipe retaining spring doesn't block the path to the idle screw. Once you have the carb in the proper position, tighten down the screw to hold it in place.

Rotate the carb a few degrees counterclockwise, and then retighten the screw that secures it to the engine. The idle screw should be easier to reach now that you've repositioned the carb.

TROUBLESHOOTING

Locked tranny

The rear tires on my truck lock up whenever I let off the throttle or try to roll the truck on a flat surface. For some reason, the wheels do not move. I took apart the slipper clutch, but that doesn't seem to be the problem. Could the transmission be the culprit? Also, my car gets about 10 minutes of run time with a 1500mAh battery pack; how much run time can I expect with 3300 or 3600 cells?

Dominick Russo Martinez, CA

Ten minutes of run time from a 1500mAh battery pack sounds decent considering that your truck has a bound-up drivetrain. Theoretically, you should be able to double your run time with a 3300mAh pack. You'll have to do some exploratory surgery on your truck's tranny to find out what causes the binding. Before you disassemble the tranny, however, remove the rear tires, and check the axles and drive pins. Sometimes, a small piece of string, a blade of synthetic grass (commonly used to give the track some aesthetic value), or other debris can wrap around the drive pin and axle and cause serious binding.

If the axles look fine, refer to your truck's instruction manual for info on removing the tranny. Take apart the tranny, and inspect the ball diff, idler gear and top gear for signs of damage (if your tranny is locked up, the damage should be easy to spot). While you're at it, check the ball bearings to make sure they operate smoothly. Replace the damaged or worn parts, and then put your tranny back together.

Left: check the axles and drive pins for debris before you take the tranny apart. Below: refer to your truck's instruction manual before taking the tranny apart. Inspect the ball diff, idler gear and top shaft gear for damage.

Replace damaged and worn

parts, and your truck should

then be good to go.





This kit contains a precision machined hardened steel primary forward gear, a hardened aluminum reverse gear and pin. RRP 8521

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RRP's NEW line of Lightened Spur and Double-Disc Slipper Kits for Traxxas Nitro and T/E-Maxx/2.5-Maxx trucks are designed to improve performance and increase reliability. This combo incorporates a machined steel or Super-Tough plastic spur, a Vented Aluminum Clutch-Plate/Gear Adaptor, 2 Slipper Pads and Plates to deliver the adjustability you need and the increased performance that you demand. Complete Slipper Kits are available in the following sizes: RRP 8166 Slipper Kit with 66T Super-Tough plastic spur (Stock Size) for E-Maxx RRP 8172 Slipper Kit with 72T Super-Tough plastic spur for Traxxas Nitro RRP 8465 Slipper Kit with 65T Steel Spur for Traxxas Nitro RRP 8472 Slipper Kit with 72T Steel Spur (Stock Size) for T-Maxx Spurs, Clutch-Plate/Gear Adaptor and Slipper Pads also sold separately.



Binding drivetrain

I just built a Thunder Tiger EB4 S3 buggy. The car went together well, but after I had finished building the kit, I noticed that the drivetrain doesn't spin as freely as I'd like. This is my first 1/8 buggy and the first RC car I built from a kit. I put the buggy together according to the instructions, so I'm a little baffled. Do you have any advice? [email] Doug Martin

A little binding is normal when you first build a kit because of the grease that's put in the sealed bearings at the factory. The drivetrain will free up after you've run a few tanks of fuel through the engine. If the binding continues, here are a few things you should check: make sure that the 3x35mm socket-head screws that secure the center-diff top plate to the bearing blocks aren't overly tight. These screws are threaded into the molded-composite center-diff bearing

blocks, and overtightening them can bind up the drivetrain.

Tighten the screws all the way and then back them off 1/4 turn.

If the binding continues, remove the front and rear diff cases from the chassis, and check the paper gaskets to make sure that they're installed correctly. The gaskets

have a slot for diff-ring gear clearance; if they're installed incorrectly, they'll prevent the drivetrain from spinning freely.

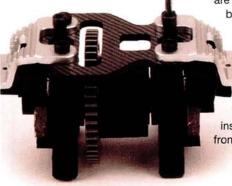


Q: I installed a big-block in my T-Maxx; must I upgrade the tranny gears?

A: Install a Robinson
Racing 66-tooth steel spur
gear and a double-disc
slipper clutch (item no.
RRP 8465). The steel spur
gear and heavy-duty slipper will toughen the drivetrain considerably.



Improperly installed diffcase gaskets can also bind the drivetrain. Make sure that the ring gear protrudes through the slot in the gasket as shown.



Check the

3x35mm screws

plate to the bear-

aren't overly tight,

or they will bind

the drivetrain.

that secure the

center-diff top

ing blocks to

make sure they



1/E-Maxx/2 5-Maxx differential gear set, includes: 1 beveled pinion gear, 1 beveled spur gear, 4 re-usable stainless steel phillips head screws, 1 tube Associated Black Grease, and a shim kit for spider gears with 10 .003' shims. 2 sets needed per truck.

DON'T SETTLE FOR SECOND!



Aluminum vented flywheels move air over clutch bell, improving performance and cooling, RRP 8551 Blue, RRP 8550 Natural Silver NEW 2.5-Maxx Vented Flywheel, Blue Only RRP 8552.



T/E-Maxx/2.5-Maxx
Replacement
Pinion

This precision
machined steel
steel pinion fits
RRP 8590 Diff
Gear, RRP 8591

T-Maxx/2.5-Maxx Aluminum High Performance Brake Kit



New, lightweight aluminum high performance brake kit, includes bigger, more aggressive brake pads and steel backing plates. One piece vented rotor minimizes side-to-side wobble. Also fits newer T-Maxx. RRP 8562 Older style half shafts use Brake Kit RRP 8560.

www.robinsonracing.com

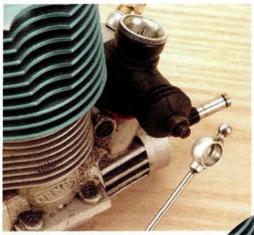
T-Maxx/2.5-Maxx Hardened Steel Clutchbells



CNC Machined from solid steel these bells are built to last. They take the 5x11 bearing (NOT included). Available in 19T, RRP 8119, 20T RRP 8120, 21T RRP 8121 and 23T RRP 8123.

ROBINSON RACING PRODUCTS

TROUBLESHOOTING



Above: the throttle-linkage ball clamps onto the low-speed needle-valve assembly; if the setscrew that holds it in place is too tight, it can bind the low-speed needle-valve screw and make it difficult to adjust.

Right: the low-speed needle valve will be easier to turn with the throttle linkage ball removed.

Locked low-speed needle

I picked up a Picco P7 because I wanted a powerful engine for my ½-scale buggy. I noticed that the low-speed needle was set extremely lean at the factory because the engine reached 290 degrees during the first tank of fuel. The low-speed needle was set flush with the opening on the side of the carb, but I've richened it to the point at which the screw sticks out 2mm, and the engine still runs lean on the bottom end. I now have the low-speed needle valve as far out as it will go, and the mixture is still too lean. I pinched the fuel line going to the carb, and the engine starts to rev up in less than 2 seconds—a sign that the low-speed mixture is set lean. What should I do? [email] Richard Johnson

I talked to a couple of fellow racers who have the same engine, and they reported similar problems. The low-speed needle valve is set lean at the factory to ensure that the engine starts easily during break-in and reaches normal running temperatures

immediately so that the piston and sleeve wear properly during the first few tanks of fuel. You're on the right track by doing the fuel-line pinch test to check the low-speed needle-valve setting, and once the needle-valve is properly set, the screw will stick out approximately 3mm from the side of the carb.

If the low-speed needle valve is stuck and you can't richen the mixture any further, there is a good chance that the needle-valve screw is binding with the throttle-linkage ball that's clamped onto the low-speed needle-valve assembly. Remove the throttle-linkage ball by loosening the setscrew that secures it to the carb. You'll notice that the low-speed needle valve will turn more easily with the linkage ball removed. Turn the low-speed needle valve ½ turn counterclockwise to richen the mixture, and then reinstall the throttle-linkage ball on the carb. The low-speed needle-valve mixture should now

from 70T thru

RRP 1680.

80T, RRP 1670 -

be a little on the rich side, and that will give you some room to tune.



Precision machined from heat-resistant,

flawlessly with our Clutchbells. Available

super tough plastic, these spurs mesh

in 63T thru 67T, RRP 2263 - RRP 2267.





ROBINSON RACING PRODUCTS

Stronger diff outdrives

I built an RC18T Factory Team kit and installed a Team Orion Baja modified motor, a Reedy GP 1100 6-cell pack and MIP CVD axles. The truck is fast and handles great, but I've already replaced the rear diff outdrives twice: once because the outdrives snapped in half, and the other time because they just wore out to the point at which the axle drive pins slipped out of the grooves in the outdrives. Is there any way to strengthen the stock plastic outdrives, or do you know of a company that offers aluminum outdrives for the RC18T? [email]

Jeff Tanner

The RC18T's plastic diff outdrives should hold up well with your motor and battery system. I didn't have any problems with mine until I installed a Mamba brushless motor system. The outdrives can wear over time, and that

causes the axle drive pins to slip out of the grooves when the truck lands off a big jump or accelerates hard. Unfortunately, I couldn't find aftermarket outdrives for the RC18T, but I'm certain that someone will manufacture them soon (sounds like a good project for Robinson Racing).

Here's an easy fix for your problem. Slide ⁵/₁6-inch Delrin or brass tapered sleeves over the outdrives, and glue them into place with CA. These tapered sleeves are used inside pressure valves, and they're available in different sizes in the plumbing section of your local hardware store. ■



Slide a 5/16-inch tapered sleeve over the diff outdrives as shown, and glue them in place with CA. This mod will ensure that the drive pins never slip out.

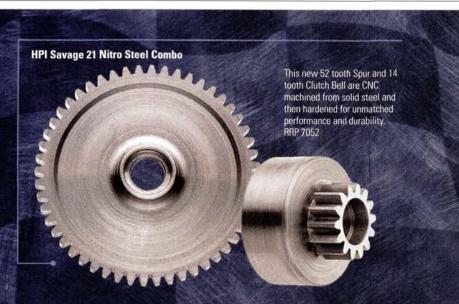
OFNA Firmset Threadlocking Fluid Some screws just won't stay put, even when you thread-lock 'em. For those repeat offenders, OFNA's new Firmset compound may be the solution. OFNA says it's the strongest around, and the choice of OFNA's team guys. A drop on each screw will keep 'em tight until maintenance time rolls around. OFNA Firmset Threadlocking Fluid—10289; \$6. OFNA Racing (949) 586-2910; ofna.com.

NEED HELP?

Send your "Troubleshooting" questions and comments to troubleshooting@airage.com, or mail them to

"Troubleshooting" c/o RC Car Action, 100 East Ridge.

Ridgefield, CT 06877-4606 USA.



HPI Savage 21 Nitro Vented Flywheel



Aluminum vented flywheels move air over clutch bell, improving performance and cooling. RRP 7000

Stealth Spurs



These precision machined spur gears are super quiet. They're available in 48P in 60T thru 96T sizes, and fit any Associated or HPI electric car or truck.
RRP 1880 thru RRP 1896.

Electric Car And Truck Pinions:

48P Absolute Series Pinions



Super hard, lightened and cut with unmatched precision. Great with any spur, but with an Absolute spur, even on-off noise is gone! Available In 48P in 16T thru 28T sizes. RRP 1416 - RRP 1428.

48P / 64P SuperLite Aluminum Pinions



They're lightened, hard coated and precision cut. Available in 48P in 16T thru 28T, and 64P in 24T thru 38T. RRP 30XX (48P) and RRP 31XX (64P). Only \$5.25

48P Hard Nickel Plated Steel Pinions

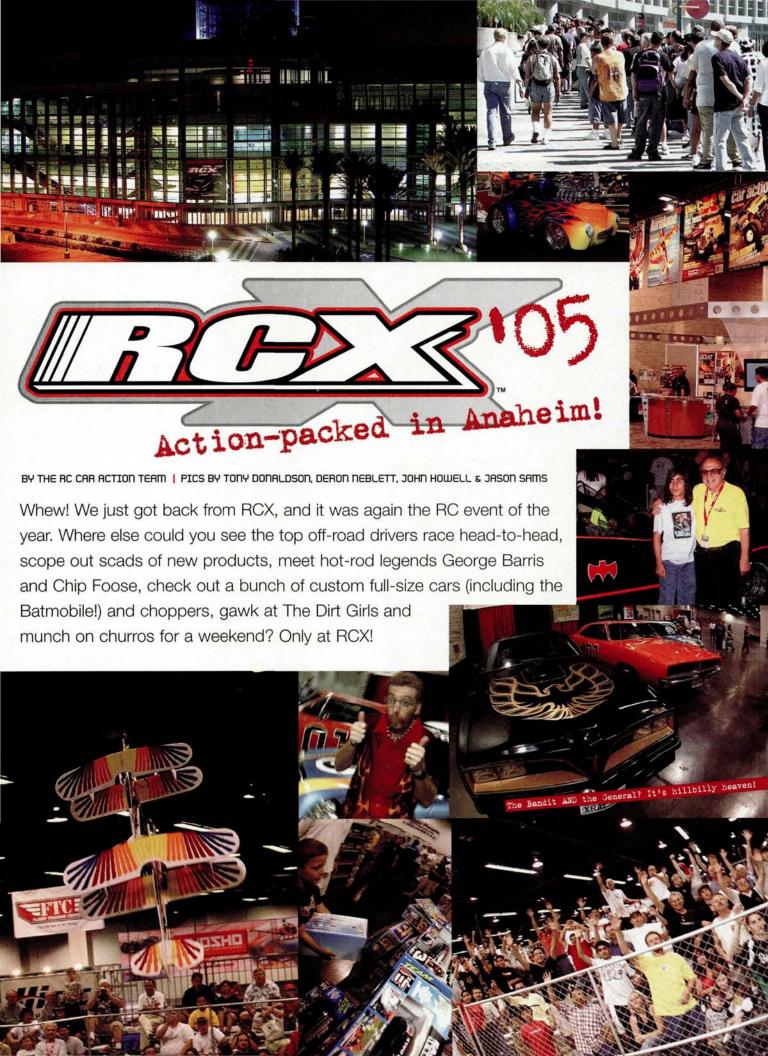


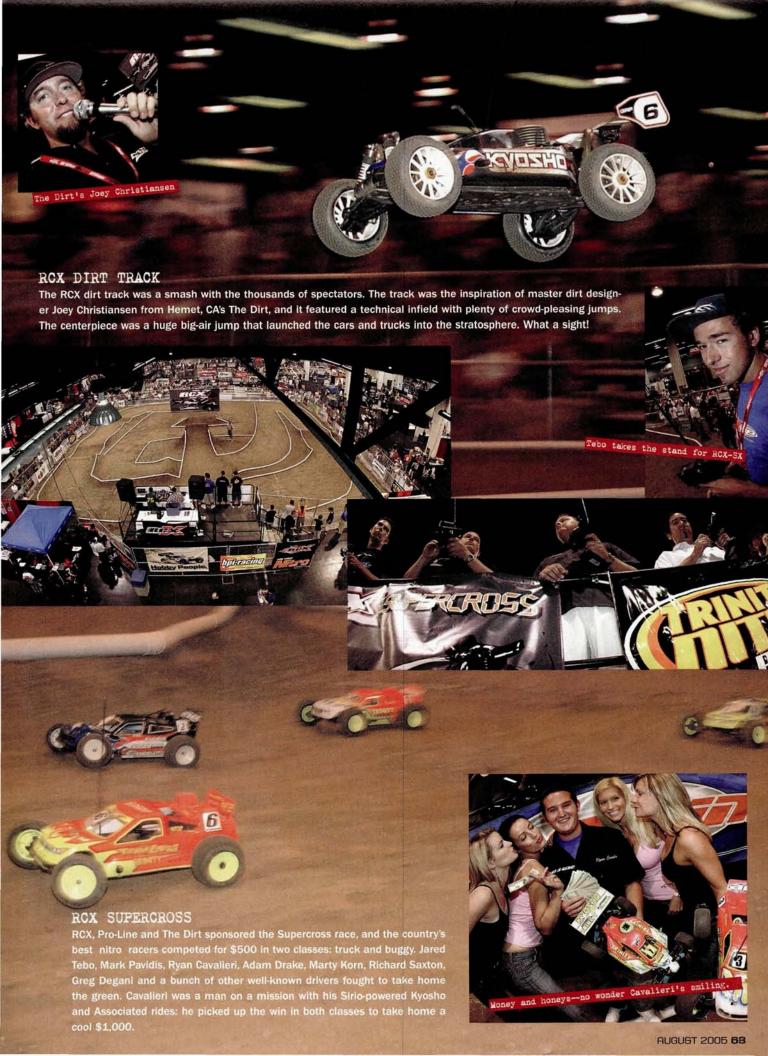
These precision cut gears have an extremely hard coating that makes them really last. Available in 12T thru 35T. RRP 1012 - RRP 1035

www.robinsonracing.com

ROBINSON RACING PRODUCTS

4968 Meadow View Drive · Mariposa, CA 95338 · Voice 209.966.2465 · Fax 209.966.5937













showstoppers AKA special RCX Inside Scoop

MORE STUFF ! Look for more gear from RCX in next month's "Inside Scoop," or click over to recaraction.com now!

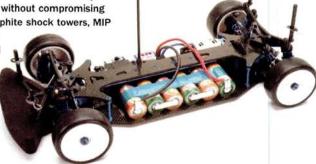
TEAM ASSOCIATED FACTORY TEAM TC4

There's a lot more going on here than the usual titanium turnbuckles and blue stuff. The plate-graphite chassis and upper deck are the most obvious new features, and they represent a new level of adjustability for the TC4. A graphite "spine" bridges the

upper and lower decks, and four screws in the top deck can be loosened or even removed to adjust the car's torsional rigidity without compromising front-to-rear stiffness. Graphite shock towers, MIP

CVDs and aluminum arm mounts are standard, and new aluminum components replace parts that are typically molded into the stock chassis. Looks tight!

Too new for item no. and price





AIRTRONICS m11

We don't know what happened to the M9 and M10, but the M11 is here! Airtronics' anticipated follow-up to the legendary M8 adds 4-channel capability, Extremely High Response Rate Technology and many other new features. There are now graphic displays for expo curves and servo outputs. a folder-based menu system, assignable switches and a really trick timer function-instead of beeping, the M11 vibrates its handle!

Too new for item no. and price

PRO-LINE ATV QUAD BODY

Looks like monster quads could be the next big thing! Pro-Line's too-new-for-a-name quad shell is designed to fit all popular monster trucks (once you add the appropriate body posts), and it looks as if HPI's Kawasaki rider figure

could swing a leg over the saddle. Or you could hit Toys "R" Us and put Chewbacca on there; it's all good.

Too new for item no. and price



IWAVER 1/28 MINIS

Whoa—a ½s-scale mini car with full-size computer radio for less than \$100? It's true! The radio has 10-model memory, an LCD screen, digital trims and ABS braking. The Iwaver on-road cars and monster truck both have full suspension, 130-size motors and a variety of color options.

Too new for item number and price





KYOSHO INFERNO MP777 SPECIAL 2

Quick! Spot the differences between the Special 2 and the Special 1! Don't feel bad; there aren't sweeping changes to the specs, but Kyosho has added subtle tweaks that lower the car's CG and improve its stability. The wheelbase is stretched by 4mm, the engine is moved back on the chassis, and the radio tray and fuel tank are closer to the chassis' centerline. It's all in the details....

Too new for item no. and price

TAMIYA TA-05

Wow, we didn't see this coming! Tamiya's new TA-05 has a centered-motor, equal-length-belt design on an all-new chassis with TA-04 arms. Ball bearings and plastic-body oil shocks are standard, and you can count on a grip of hop-ups for the new sedan. Tamiya showed the chassis with two body kits: a Mercedes C-class DTM 2004 and a Ferrari F430. TA-05 Mercedes DTM 2004—item no. 58350; TA-05



SPEKTRUM DX3 RADIO SYSTEM

If you've been saving up for a new module-style radio just so you can run a Spektrum system, you're in luck. Spektrum just announced the all-in-one DX3, a well-featured transmitter with the inno-

vative no-channels, no-crystals 2.4GHz DSM technology built right in. The DX3 has everything you really need (including 3-model memory, steering and throttle endpoints, steering dual rate, sub-trim and 3-channel mixing), but it skips the less-used, ultrahigh-end adjustments to keep the price down. The DX3 will hit shops at about \$250. DX3 DSM system—SPM2030, \$250





OFNA JAMMIN' XR-CRT

You're looking at the first-ever ROAR
National Champion nitro monster truck—the Jammin' Jay-designed XR-CRT. The truggy treatment includes a stretched wheelbase and longer suspension arms, and the rims are compatible with Pro-Line 40 Series rubber (OFNA tires are included).



Like the Jammin' buggy, the CRT is a full pro-spec ride, with a full complement of graphite and CNC parts.

Too new for item no. and price

PRO-LINE INFERNO 1/6-SCALE CROWD PLEAZER 2.0

So, you and your buddies all got Half-8
Infernos; too bad they all look the same!
Pro-Line's new shell will give you a chance
to paint your own, and you'll get the popular Pleazer look, too.

Too new for item no. and price



This TNX revamp is only in the proto stage, but it's lookin' good with pivot-ball suspension, MIP CVDs, 23mm hexes and a new blue chassis. All the goodies from the TNX Pro have been carried over, including the Pro-Line PowerStroke shocks and TRF blue-anodized heat-sink head.

Too new for item no. and price





HPI KAWASAKI V-FORCE 700

Team Green's bodywork duplicates Kawasaki's V-twin-powered hot-rod quad, but it's 100-percent Savage stuff under the factory-painted rider's butt. That means you get the usual HPI monster-truck goodness: 8 mega-travel shocks, .25 power, 2-speed tranny, a TVP chassis and more.

Too new for item no. and price

LRP ENGINES, MOTORS & BATTERIES

LRP's popular power line has finally arrived stateside! The full range of batteries includes VTEC 3700mAh matched packs and sport packs ranging from 1600- to 3500mAh (the 1600mAh model will sell for less than \$10!). LRP also showed off its machine-wound modified V10 Spec 4 and GT3 Turbo motors down to 9 turns, and three new engines: Z.12R Team, Z.18S Pro pull-start and Z.28 Spec 2 pull-start. The big-block will also be offered in a shaft-



start-ready version for Savage and Monster GT duty.

Z.12R Team—31250; Z.18S Pro—31800; Z.28R Spec
2—32081, pricing to be announced; VTEC matched packs—various item nos., pricing to be announced; V10 & GT3 motors—item nos. vary with wind, pricing to be announced

HOT WORKS REAL CRAFT BODY SERIES

No, Hot Works isn't selling complete cars, but it is selling painted bodies and color-coordinated wheels packaged like complete cars! The wheels even feature brake rotors, and mounted tires are included. Look for a bunch of styles at about \$50 each.

Too new for item no. and price





XTM RACING MAMMOTH ST

XTM's lower, racier version of the Mammoth looks like a truggy to be reckoned with. Beefier shock towers, 4-shock suspension, dual front and rear braces and racing rubber on dish wheels give this big ride a track-ready stance, and the 24.7 pull-start power makes it fast—especially with the stock 2-speed tranny. A lower, sleeker body completes the Mammoth's high-performance makeover, and Hitec supplies Aggressor radio gear, minus the steering servo. Cirrus handles that duty with a 186 oz.-in. metal-gear unit!

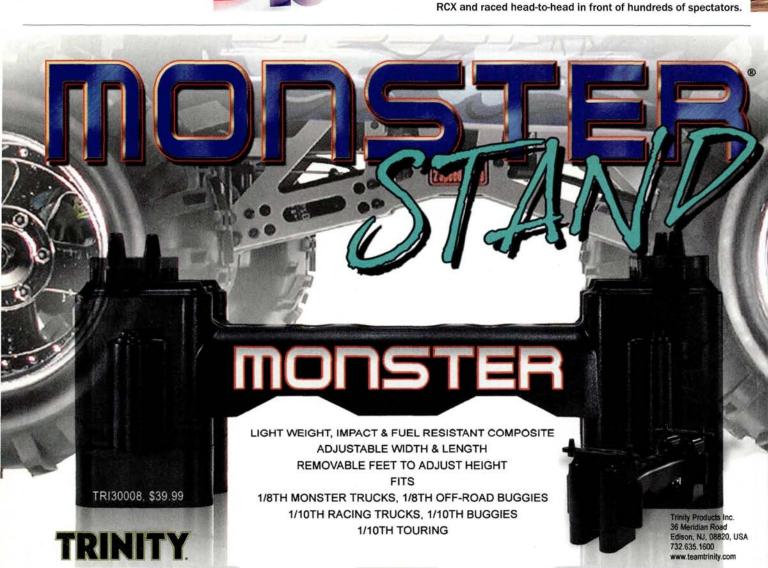
SPORTWERKS MAYHEM ST

Ready to go truggy? The popular Mayhem buggy is the latest to get the big-tire treatment, with all the usual Sportwerks good stuff. The short list includes a .26 engine, oil-filled diffs, hard-anodized shocks and a JR XR2i computer radio system. And like all Sportwerks cars and trucks, the Mayhem ST is fully RTR with glued tires and a painted, mounted body.

Mayhem ST RTR—SWK1210, \$650







SOUTHWEST ARMOR GROUP

Thanks to the good folks at Southwest Armor, RCX had one of the largest collections of RC tanks ever assembled. The $\frac{1}{6}$ - and $\frac{1}{16}$ -scale tanks stopped spectators in their tracks (get it?). Southwest Armor puts on demos all across the country, and they were a great addition to RCX.

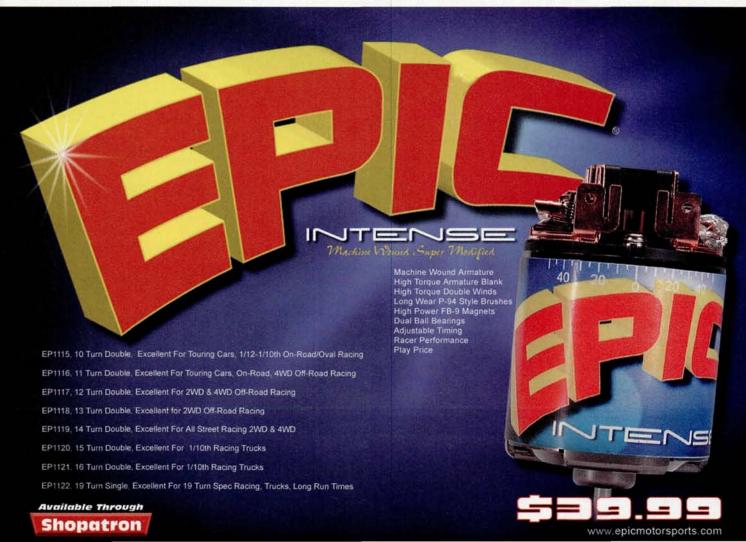


MAKE IT, TAKE IT!

Shows mean free swag, and at RCX, there was plenty. Hundreds built special RCX-edition airplanes and took them home or flew them right there (duck!). Many exhibitors held raffles,

and thousands of dollars' worth of merchandise was given away—car kits, electronics, radio systems, accessories and more.









YOKOMO MR-4TC KEI OFFICE S15 SIVIA

This green machine is the latest in Yoke's D1 Drift Package series, the original out-of-the box RC drifters. As usual, the bodywork flawlessly duplicates the real sideways super car, and Yokomo's unique "drift ring" tunable low-grip tires make it easy to drift like a pro. You can get it as an unassembled kit or as a ready-to-run (or ready-to-drift, as the case may be).

Kit-DP-KOS15, \$250; RTR-DPR-KOS15, \$325

PRO-LINE COMMANDO 40 SERIES HD BEADLOC WHEELS

Sweeeeet. Those beadlock rings aren't just for looks, they really hold the rubber to the rim—no glue required. The design is licensed from Weld, and the trick hub cover is included. 2680-01, \$45 (pair)



CET The look mat axle

KO PROPO EX-10 HELIOS PRO

KO goes gold and adds a few new features with the Helios Pro. The drop-down wheel can be set parallel to the face of the radio, or you can swing it out to just the right angle for comfy steering. The module is new, too, with a CPU-driven ultrafast-response system and built-in heat sink. Otherwise, all the standard Helios features have been carried over. Our favorite is still the big-character LCD screen with jog-wheel navigation.

Too new for item no. and price



The CEN guys aren't fooling around; this C-hub machine looks ready to race. The Matrix has all the features to match the comp, including 4mm shock towers, CV-style axles (center axles, too!), and quad-disc brakes. Low-CG 6-gear diffs; 3.5mm shock shafts; and hardened-steel gears. All of the plastic parts look tough, too, with extrathick rod ends and turnbuckles. A pro-level kit and RTR version with .26 engine and Airtronics MX-3 FM radio will be available soon.

Too new for item no. and price

FMA DIRECT SCORPION LI-POLY SYSTEM

Li-poly battery tech is already big in the "microverse," and it will undoubtedly be a force in the sub-C scene, especially now that FMA's Scorpion battery/charger combo is available. Just charge and run; the charger and battery are

"smart" and won't overcharge or discharge.

Meanwhile, you get bigger volts and longer run time.

Scorpion 2 charger—
LIPOCH2S10, \$130;
Scorpion 3200 Li-poly battery—SCKOK3200-20C-1P2S, \$170



MAGMA APS RACING

ENGINE DIAGNOSTIC SYSTEM

APS has updated its engine telemetry system with an included engine mount to fit most ½10- and ½8-scale monster truck engines.

Once installed, the system transmits real-time data including max rpm (up to 90,000) and max temperature (up to 390F). The recording module weighs just 20g, and the LCD is detachable, so you can leave your PC at home.

Engine Diagnostic System—APS3309, \$160



ALUMINUM AIR FILTER FOR REVO

RDLogics has a bunch of stuff for the Revo; this is the latest. The aluminum air-filter insert has a larger element for greater airflow and longer life between cleanings, and the screwtopo design makes it easy to access the element.

Too new for item no. and price

DURATRAX FREQUENCY CHECKER

Do you really trust everyone to use a frequency
clip at the track? No? We
don't either, and that's why
we like this gizmo from
DuraTrax. Turn it on, and
the frequency checker
goes through every channel to see who's on what
and lights up any "on" frequencies to help keep you
out of glitch city.
75MHz Frequency
Checker—DTXP3110,



RC SOLUTIONS LST CAGE

How do you make an LST even tougher? Cage it. RC Innovations' trademark plate-style design is now available for the LST, and it works with the stock body and mounts. It's tough enough to stand on (we know you guys like to use your trucks as stepladders), and you can get it in a variety of colors.

Too new for item no. and price





XXX MAIN "HOW TO PAINT" DVD

You can probably guess what this DVD is about! Step-by-step instructions help you take your body from clear to colored, and there are even tips for using XXX-Main's internal graphics and decals. When you're finished learning about painting, there's 10 minutes of bonus action footage that will get you pumped up to wreck that freshly-painted shell.

Paint DVD, \$15



RPM RC PRODUCTS 18T BUMPER

Ever smash into stuff with your mini? Never? Really? Well, skip this one then. For those of us not living in fantasyland, RPM's bumper will protect your 18T's arms and give your ride a little extra style. It available in black and blue and is molded of RPM's usual indestructo-stuff. 18T Bumper—70032, \$7

NOVAK GTB COMPETITION BRUSHLESS SPEED CONTROL & VELOCITI MOTORS

The Orange guys have developed a pair of racing-specific brushless systems, and both are designed around the new, smaller GTB speed con-



trol. The GTB is brushed-motor compatible with no motor limit, and it's fully programmable and fan-cooled. You can get the GTB by itself or with one of the two new Velociti motors: the 6.5R (6½ turns) and 5.5R (5½ turns). In addition to hotter winds, the Velociti powerplants have oversize front bearings and stronger magnets than Novak's SS motors. GTB speed control only—1710,\$180; GTB with 6.5R/5.5R motor—3002/3003, \$250; Velociti 6.5R/5.5R motor only 3405/3406, \$85

NOMADIO SENSOR DIGITAL RADIO SYSTEM

The original name in 2.4-gig radio technology is now for real and is shipping (full review coming soon). No channels or crystals, high-response rate, built-in telemetry, and RC's most unusual case design make the Nomadio Sensor a true original.

Sensor Digital Radio System (with transceiver, sensors and software)—SEN1-SYS, \$585



PARMA/PSE RC18T BUGGY BODY

Nice—where'd ya get the wing mounts? There aren't any; the wing is molded with the body, so all you have to do is clip it on and presto: instant mini-buggy. Now go bug the kid with the Half-8.

Too new for item no. and price



NOVAK GTS PRO SPORT

Along with GTX transistor tech and the usual Novak features (One-Touch Set-Up, Polar Drive, Radio Priority circuitry and thermal overload protection), the GTS has a small footprint (1.3x1.1 inch), removable input harness and spins mod motors down to 12 turns. The best part? It sells for about \$80. Now you can race and still afford lunch. GTS Pro Sport—1940, \$80

TSAIS EXHAUST PIPES

If that isn't the best chrome ever, we don't know what is. Tsais' (sounds like "tie") Revo pipe and new high-performance single-exhaust pipes have a unique big-bore stinger that you can telescope in or out for a custom fit. Revo pipe—TSREVOO1C, \$80; additional styles, \$60 to \$90





LRP A.I. RUNNER SPEED CONTROLS

The Runner is back in a new, smaller package (25x25mm) with LRP's no-programming Artificial Intelligence software on board. The two available models are the Runner (for motors down to 18 turns) and Runner Plus (for motors down to 15 turns). Both have fail-safe protection and are 100-percent waterproof.

Runner—83010; Runner Plus—83060, pricing to be announced

TAMIYA DESERT GATOR

Tamiya's DT-02 chassis debuted as the friction-shock Super Fighter G (reviewed in this issue), but Tamiya has now tricked it out as the Desert Gator with a lightweight Lexan



body and wing, oil shocks, adjustable upper links and dish wheels. Expect upgrades galore for this one! Desert Gator— 58344





TEAM MUCH MORE CELL MASTER CHARGER & POWER STATION

Team Much More actually had much more stuff than we can fit here. The Cell Master charger charges and discharges at up to 10 amps. It has peak and temp-sensing charge modes and even handles Li-ion and Li-poly cells. The Power Station is a clever junction box that lets you channel power from your power supply without the typical mess of tangled alligator clips. Much More also showed off a dyno, tire warmers, discharge trays—tons of stuff!

Cell Master Charger—MM-CTXC; Power Station—MR-PSK, pricing to be announced



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Battery Sponsor



Stunt Track Sponsor



Trade Sponsor





Team Associated Control of the Contr

KIT FEATURESI

CHASSIS. The RTR features exactly the same molded-composite, semi-tub chassis as the unassembled Team Kit. The chassis is stronger and more rigid than the original TC3 chassis, and the weight of the battery and other electronics is closer to the chassis centerline to improve handling.

The steering servo, receiver, speed control and motor are mounted on the right of the chassis, and the 6-cell battery pack (not included) occupies the entire left side. A foam spacer allows you to move the pack forwards or backwards to adjust weight distribution, and a molded battery strap held with body clips secures the battery.

The chassis has a large opening underneath the motor to allow cooling, and an optional forced-air duct system is available if you decide to upgrade to a motor with more power and a suitable speed control. A large foam bumper sandwiched between molded upper and lower mounts protects the chassis and body.

DRIVETRAIN. The TC4 RTR's shaft-drive 4WD system is all about simplicity and efficiency. All the drive parts spin on metal-shielded ball bearings that, in turn, provide high speeds and longer run times.

The front and rear ball differentials have D-shaped rings that are keyed to light plastic outdrives, and hard steel balls are used in the diff gears and thrust assemblies. On our test vehicle, the diffs were perfectly adjusted with the tension set a little tighter in the front. The diffs are in sealed cases to ensure an almost maintenance-free drivetrain. Light plastic CV axles spin the wheels.

The 3-piece motor mount has plenty of cooling fins for efficient heat dissipation, and swapping pinion gears couldn't be any easier. The TC4 RTR comes with a 23-tooth pinion gear and a 72-tooth spur gear.

SUSPENSION AND STEERING. The TC4 RTR's front and rear shock towers have plenty of mounting options, and there are also several places to install the inboard vertical ball studs.

The front and rear suspension arms have a couple of lower shock-mounting options, and they pivot on hingepins that are held by front and rear arm mounts. Pivot balls attached to the ends of the hingepins are pressed into sockets in the arm mounts to provide bind-free suspension-arm movement. Front kick-up, dive and rear anti-squat, pro-squat and toe-in can all be adjusted with shims. You can also make subtle wheelbase adjustments at both ends.

INCLUDED ELECTRONICS & ACCESSORIES

TEAM ASSOCIATED/ AIRTRONICS BLAZER SPORT RADIO SYSTEM

The made-by-Airtronics-for-Associated Blazer Sport 27MHz AM radio system features steering and throttle-trim knobs, servo-reversing switches and a handy steering dual-rate function. The three-light battery meter warns you when the

LRP AI SUPER REVERSE SPEED CONTROL

The Al Super Reverse can handle a 13-turn motor, so the included 15-turn mill hardly gives it a workout. Highfrequency switching ensures smooth, proportional control in forward and reverse, and the built-in fail-safe software shuts off the throttle if someone



batteries are dangerously low, and the radio has a built-in charging jack for use with rechargeable batteries. A 2-channel micro-receiver is installed on its side with the frequency crystal within easy reach.

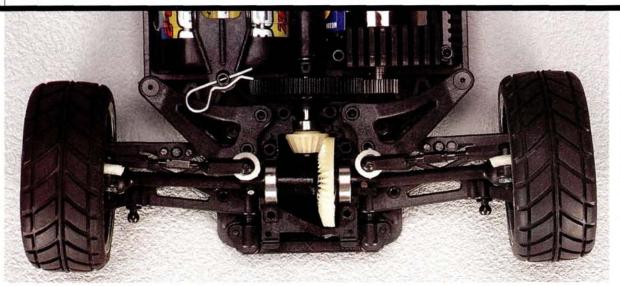
TEAM ASSOCIATED/ AIRTRONICS 94102 SERVO

The standard, plastic-gear steering servo has approximately 50 oz.-in. of torque—plenty for the light TC4 RTR.

switches to the channel that you're on. The Al Super Reverse does not require any setup: just pull the trigger to full throttle and it sets itself.

TOOLS

The supplied tools include a molded-plastic wrench set, L-shaped hex wrenches and camber- and droop-setting tools—everything you need to wrench on the car.



4WD doesn't get much simpler than this. The main driveshaft spins the differentials directly via bevel pinions, so the entire system has only three gear meshes, including the pinion and spur gears. Since the TC3, this setup has become the standard for shaft-drive touring cars.

SPECIFICATIONS

MANUFACTURER Team Associated MODEL RC10TC4 RTR SCALE ¹/₁₀ PRICE \$265 Varies with dealer

DIMENSIONS

Wheelbase 10.18 in. (259mm) Width 7.5 in. (190mm)

WEIGHT

Total, as tested 55.65 oz. (1,577g)

CHASSIS

Type Molded semi-tub Material Fiber-reinforced plastic composite

DRIVETRAIN

Type Full-time, shaft-driven 4WD Primary 23T pinion/72T spur Transmission ratio 2.5:1 Final drive ratio 7.83:1 Driveshafts Plastic CV axles Differentials Ball with plastic outdrives Bearing type Metal-shielded

SUSPENSION

Type Lower A-arms with turnbuckle upper links

Shocks Composite-plastic VCS

WHEELS

Type Associated 8-spoke

TIRES

Type Team Associated directional radials

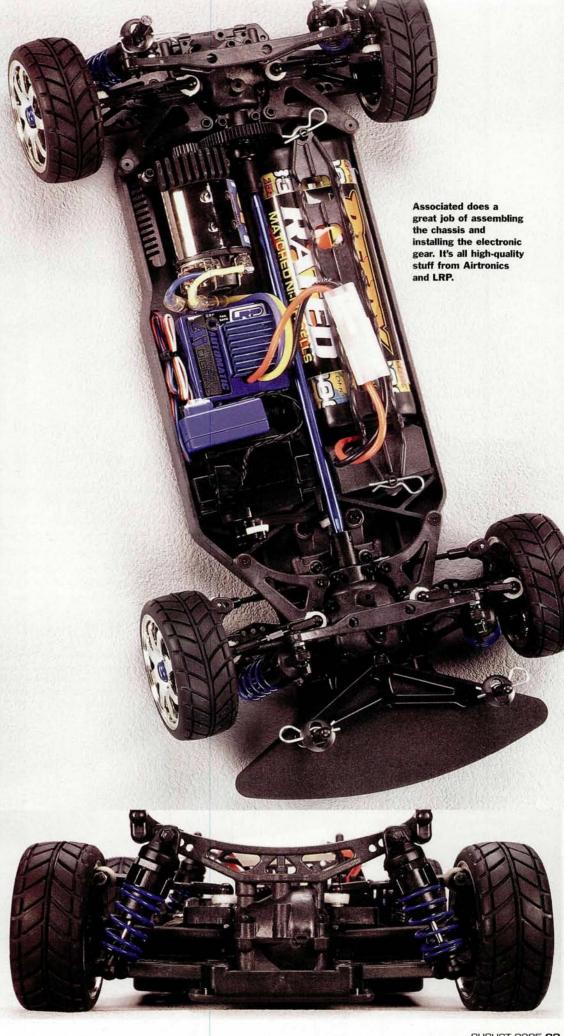
ELECTRONICS

Radio Team Associated/ Airtronics 27MHz AM Servo Team Associated/ Airtronics 94102 Speed control LRP AI Super Reverse Motor Team Associated 15-turn

FACTORY OPTIONS

- Hard-anodized threaded shocks—3985
- Complete carbon-components kit—31042
- Titanium turnbuckle kit-31052
- Front one-way assembly—3978
- Motor-cooling fan and duct-
- 31037
- Front anti-roll bar kit-31057

The new shock towers offer more mounting options, and the body posts are mounted farther toward the outside to support the body more. Vertical ball studs simplify camber and roll-center adjustments.





Steel turnbuckles allow easy camber and front-toe adjustment, and plastic versions of Team Associated's VCS shocks provide the damping. The shocks

feature double O-ring shaft seals, volume-compensating foam inserts and O-ring-sealed caps. They're filled with silicone fluid at the factory, and they operate smoothly.

BODY, WHEELS AND TIRES. The TC4 RTR is topped off with a cool street tuner body that you can customize using a sheet of decals that gives you two complete trim options. You can mount the body low without having to worry about the tires scraping it

inside, and the big rear wing looks great. Long-wearing, directional-tread tires mounted on chrome-plated, 8-spoke wheels complement the body and provide great traction on a variety of surfaces.

Associated includes two sets of tuner-style decals to dress up the factory-painted body, and chrome wheels are standard.

Above: vertical ball studs are used up front, too. Team Associated says the star-shaped drive hexes fit most standard touring-car wheels precisely. I love the TC4's captured hingepins—no E-clips to lose, and the pins are easy to remove. Right: the standard, plasticgear servo does an excellent job of controlling the TC4. The new steering system is directly from the Nitro TC3; it's smooth and doesn't get fouled by track debris.

LUINE

Moving the battery pack forwards will give the car more on-power steering, and moving it rearwards will increase rear traction. If you use side-by-side cells, you can place three up front and three in the rear with a foam spacer in between to center the pack.

LIKES

- > Excellent instructions and getting-started advice.
-) Great electronics package.
- Raceworthy, fully adjustable suspension.
- Import-style body and wheels.

DISLIKES

"None," by play-driving standards. Experienced drivers will want a faster motor.



>>> Go to page 225 for manufacturers' contact information

TRACK TEST Team Associated RC10 TC4 RTR

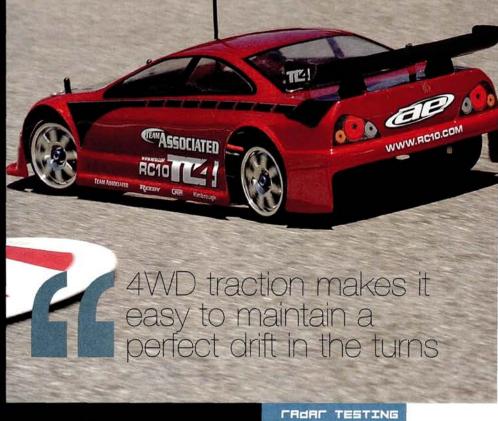
PERFORMANCE

After installing the transmitter batteries and plugging in the 7.2V battery pack, I was ready to go. I was glad to find that all of the radio trims had been set spot-on; getting the TC4 rolling almost seemed too easy. First came the speed trials; who doesn't immediately grab a handful of throttle the first time he latches on to a transmitter? The TC4 blasts off with decent torque until it runs out of legs at 23.5mph. It's not a speed demon by racing standards, but it's much faster than many other electric RTRs, and impressively fast by first-time-driver standards.

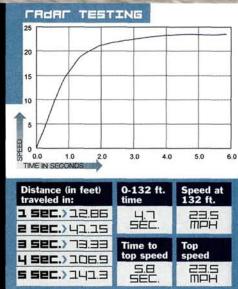
After the speed runs, I set up corner markers to test the TC4 RTR's steering. A noticeable on-power push had me letting off the throttle to get it to turn in sharply on the tighter turns, but it transitioned extremely well through the twisties and carried all the speed that the motor could muster on the long, sweeping turn that I set up. Driving through a series of turns definitely lets you discover that there's a race car underneath that street-tuner body. It's also reassuring to know that it has all the tuning adjustments of the TC4 Team Kit, so it's perfect for honing your tuning skills.

The TC4 RTR felt planted at all times. I tried to disrupt its grip by moving the steering wheel quickly from left to right a bunch of times as the car tracked along at full speed. There was no shaking it, and that showed it could easily handle a lot more power. I headed down the street and found a sandy section of asphalt. At last, I got the tires to lose their grip; this allowed me to toss the TC4 RTR into turns, peg the throttle and see its rear end slide out. The 4WD traction makes it easy to maintain a perfect drift in the turns, and there's nothing cooler than swinging the rear end like a pendulum.

The TC4 RTR is so easy to drive that you'll rarely have to rely on the speed control's



reverse capabilities to back out of trouble, but you will use it often for stunt maneuvers (such as the always-popular Starsky and Hutch-style reverse 180). I decided to test the reverse and the strength of the drivetrain by running the car at full speed in reverse and then jamming the throttle trigger to full forward while turning. The TC4 RTR swapped directions and shot forward without missing a beat. I launched it off a couple of deep cracks that sent it barrel-rolling, and it plowed into a concrete curb at least twice (who put that thing there?). Some of the decals were scratched, but the TC4 RTR continued to track straight and didn't need additional steering-trim adjustments.



THE VERDICT

If the TC4 RTR had threaded-body aluminum shocks, MIP CVD axles and rubber-sealed bearings (instead of metal-shielded bearings), it would have the same specs as the TC4 Team Kit. It's that close! The cars' molded suspension and chassis and drivetrain components are the same, and the TC4 RTR is every bit as

adjustable as the Team Kit. It's a stable, rugged platform that beginners can grow with and time-crunched, experienced drivers can quickly upgrade for track duty. The TC4 is supported by a host of Factory Team accessories that boost its performance to world-class standards.

PRTINGS

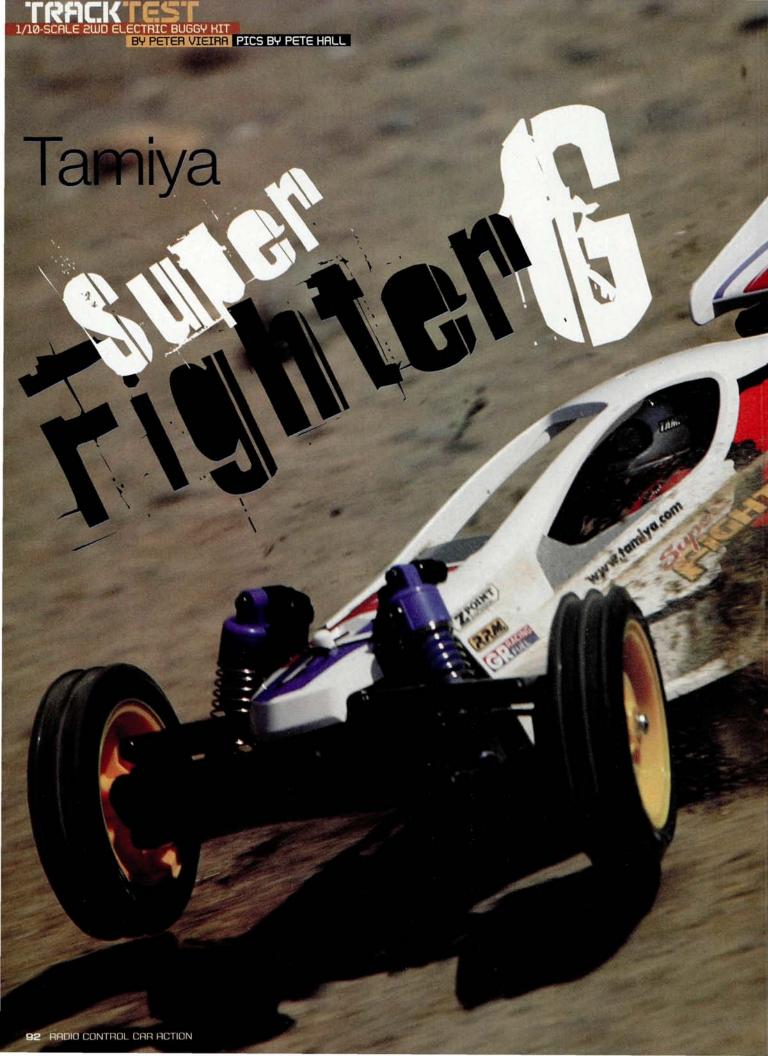
Included electronics 00000000 B.5 Basic radio system, awesome speed control and reliable 15-turn motor.

Parts fit & finish •••••••• = I couldn't have built it better myself.

Turn-in 0000000000 E.5 The TC4 RTR turns in well despite its on-power push.

Corner speed 000000000 E The TC4 RTR uses every bit of the motor's speed in the corners.

Best buyer>>> Beginners, racers and street racing fans.





KIT FEATURES

CHASSIS. The DT-02 chassis is a deep ABS tub with molded-in mounts for the antenna and on/off switch, and a roomy battery tray with a flip-up strap for easy pack access. A short upper deck covers the steering servo, but otherwise, the chassis is braced only by its tall walls and battery-tray sills. The front- and rear-suspension assemblies add extra stiffness once installed, but there's still plenty of give to make the SFG highly crash-resistant.

DRIVETRAIN. Like the DT-01, the DT-02's gearbox is molded out of a transparent, smoke-tinted plastic that lets you see all the gears in action. It's basically a 3-gear setup, but the top gear and idler gear share the same shaft. The supplied 540 motor spins the spur gear directly (no slipper clutch), and gear mesh is preset with two pinion options: 17-tooth (provided) and 19-tooth. As expected, the differential uses Tamiya's good ol' 5-gear setup, but thick-walled, plastic outdrives molded around metal shafts that are keyed to the diff's output gears replace the familiar splined metal outdrives. The dogbones are also plastic (with steel drive pins, of course), and plastic bushings outfit all the rotating parts. I opted for ball bearings and would really love to see them included as standard equipment. I'd be happy with Chinese cheapies; Tamiya's super-qual Japanese bearings could remain optional.

SUSPENSION AND STEERING. Tamiya went for simplicity and durability in this department. Thick upper and lower arms secured by screw-in hingepins spare first-time kit builders the hassle of E-clips and finicky camber-rod assembly, but they also eliminate adjustability—not that first-timers are likely to care.

Disappointingly, the SFG's shocks are friction-type units that use greased rubber sleeves to provide uneven damping—and not much of it. Costs have to be cut somewhere (and I've already made my ball-bearing plea), but howzabout making the optional plastic-body, oil-filled CVA shocks standard equipment? They're better performers, and they represent a touch of "real-car" tech that just makes RC a little extra-cool. At least, that's how I felt when I built my first kit's oil shocks so many years ago.

The SFG's steering setup is also simple and omits bellcranks in favor of a direct connection between the steering servo and steering arms. Threaded rods do the connecting, so toe-in can be adjusted, and a softly sprung servo-saver is provided. It's a good match for the low-cost servos that most buyers will undoubtedly use to complete the car and the abuse they're sure to give it.

BUILDING AND SETUP TIPS

The Super Fighter G is a very easy build, and Tamiya's manual is excellent, as usual. Assembling the car can take as little as an hour for an experienced builder. Beginners can knock it out in a few after-school sessions.

DON'T SKIMP ON THE SCREWDRIVER

Before you start building, invest in a high-quality no. 2 Phillipshead screwdriver. I like the type with a coated tip, like the Tamiya 74006 or DuraTrax DTXR0124. These screwdrivers fit precisely for a smoother build, and they're affordable (expect to pay 5 to 10 bucks).

STEPS 6 TO 10

The manual shows the full width of the gear teeth being painted with grease, but all you really need is a dot of grease at four points around each gear's diameter (think of each gear as a clock, and grease it at 12, 3, 6 and 9 o'clock). As the gears turn, the grease will be evenly distributed.

STEP 14

It's much easier to thread the shock shafts into the spring perch/rod ends if you first lubricate the tip of the shaft with the supplied grease. Be careful not to thread the shafts too deeply, or they'll distort the rod ends.

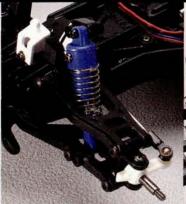
STEP 20

Before you install the steering servo or mount the servo-saver, "center" the servo by powering the receiver with a 4-cell battery holder (your radio probably includes one) or by plugging in the SFG's supplied speed control. Plug the servo into the receiver, turn the transmitter's wheel to make certain the servo operates properly and then center the radio's steering trim knob. The servo is now ready to install.

INCLUDED ELECTRONICS. I like the new direction Tamiya is taking by including electronic speed controls with many of its kits. Convenience and performance are increased substantially compared with a mechanical speed control, and cash-strapped buyers don't have to shell out for an extra component before they get to see their car go. The supplied TEU-101BK speed control has pushbutton setup, gear-saving double-pump reverse operation and a "power on" alarm that alerts you if you turn off the transmitter but forget to turn off the car. There's even a reverse-lockout mode if you plan to give racing a try. It can handle motors down to 20 turns, so spinning the SFG's 540 Mabuchi



The front and rear suspensions can be removed intact for easy maintenance. Note that the rear suspension arms attach directly to the gearbox.



The front end is super tough, thanks to flexible plastics and a beefy upper/lower arm arrangement. Friction shocks do the damping.



Instead of bellcranks, the Super Fighter G connects the servo to the steering arms directly. The threaded rods let you adjust toe-in.

SPECIFICATIONS

MANUFACTURER Tamiya MODEL Super Fighter G SCALE 1/10 PRICE \$100 Varies with dealer

DIMENSIONS

Wheelbase in. (259mm) Width in. (240mm)

WEIGHT

Total, as tested 57.6 oz. (1,633g)

CHASSIS

Type Tub Material Molded ABS plastic

DRIVETRAIN

Type Enclosed gearbox Primary 17T pinion/55T spur gear Driveshafts Plastic dogbone Differentials Bevel-gear Bearing type Plastic bushings

SUSPENSION

Type Upper and lower H-arm **Shocks** Plastic, friction-damped

WHEELS

Type Tamiya Star dish, 2.2 in.

TIRES

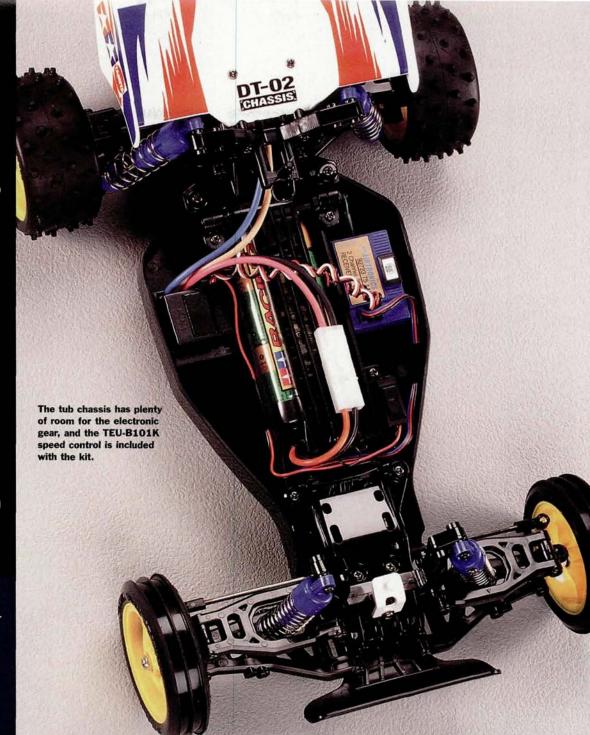
Tamiya Super Gripper rear stud/front rib, hard rubber

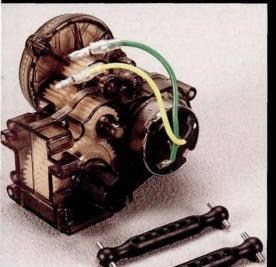
ELECTRONICS

Transmitter/receiver Not included Servo Not included Speed control Tamiya TEU-101BK Motor Mabuchi 540 Battery Not included

FRCTORY OPTIONS

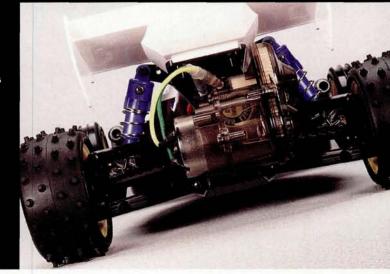
- CVA oil-damped shocks (F/R) item nos. 50519/50520
- RS540 Sport Tuned motor— 53068
- 5x11mm sealed ball bearings (4)—53008
- Spire Spike rear tires (pair)—53093





Left: the Super Fighter G's transparent tranny case shows off its wide, beginner-proof gears. The dogbones and outdrives are plastic, but thickly molded for strength.

Right: despite its beginner-mobile mission, the Super Fighter G rides low like a racing buggy.





motor is no problem. If you do overtax the speed control, its thermal overload sensor will shut it down until it's safe to operate. It's also short-circuit protected, which makes the TEU-101BK just about beginner-proof.

Tamiya molds the body in white, so all you have to do is add decals to get the look seen here. For the full box-art effect, you can paint the driver figure and "mufflers," as I did.

BODY, WHEELS AND TIRES. A Tamiya buggy just wouldn't be a Tamiya buggy without an anime-lookin' body shell, and the SFG certainly has the sci-fi vibe going for it. The cockpit-forward design is molded of white plastic, and bolt-on mufflers give it an aggressive quad-exhaust look. Tamiya also supplies its classic helmet-and-shoulders driver figure so you can practice your detail painting skills (like I did, with mixed results). The white body looks great with the included decals, but you will need to bust out a can of spray paint if you don't want white mufflers. I used Tamiya's suggested TS-42 Light Gun Metal.

Studded, low-profile rear tires and sharply ribbed front tires snap securely onto the wheels without need for glue or foam inserts because the vinyl-like rubber is so hard. "Long wear" is the name of the game here. The dish-star rear wheels are shared with Tamiya's Gravel Hound, Rising Star and Bajaseries buggies, and they'll accept any 2.2 buggy tire when you're ready to upgrade. The front hoops are also 2.2s, but they're just 19mm wide, so tire-upgrade options are limited.

LIKES

- Sci-fi styling with no painting
- Includes an excellent reversing speed control.
- Easy build for beginners.

DISLIKES

- > Slow with the included motor.
- Friction shocks absorb only the mildest bumps.

OFIND IT

So to page 225 for manufacturers' contact information.

PERFORMANCE

I guessed the Super Fighter G's top speed would be 15mph, and the radar recorded 16.5. Blazing, it's not. But for first-time drivers trying to get the hang of turning right and left without smashing into things, 16mph is about as fast as they should go. The SFG's low speed is much less apparent when driving in tight areas, and what the Mabuchi 540 motor lacks in speed it makes up for with torque. The buggy scaled a grassy hillside and slick patches of exposed granite easily, and it churned playground woodchips with a kid-thrilling spray from the rear tires. The skinny, deeply ribbed front tires have little grip on pavement, so the SFG turns very wide under power when cruising the driveway, but the sharp ribs dig into dirt tenaciously enough to break the rear tires loose into a slide when driving off-

road. Just watch out for bumps; the shocks offer very little damping, and the SFG kicks and darts as the chassis slaps and rebounds over rough terrain. Likewise, the buggy doesn't like to jump (or more precisely, it doesn't like to land) because the shocks let the chassis bottom out harshly. Luckily, the SFG is more than up to the abuse. For the ultimate torture test, I squeezed under a fence to sneak into the local skatepark for a concrete freestyle session. I had a blast doing fakies up the big quarter pipe, blasting air over the spine ramp and jumping all sides of the fun box. I even pulled off a few rail slides! For every trick I pulled, I probably cased it five times. The poor SFG rolled off the top of the quarter pipe (a good 10 feet up) and landed squarely on its transmission. No damage. I cartwheeled it in an

ellough to break the real times loose line a sinde when thing on

attempt to alley-oop across the half pipe. No damage. I landed the buggy on its roof when I dropped in from the deck on the quarter pipe. No damage! Well, scratches, of course, but nothing that stopped the SFG from running. Even when I wasn't crashing the car, the chassis was taking mounds of abuse as it slapped the hard concrete on every landing. When the pack finally dumped (after more than 25 minutes of nonstop running!), the SFG had a lot of battle scars but no mechanical problems. No bent hingepins, no broken arms, no cracked parts. It's a tank!

TIME IN SECONDS

THE VERDICT

Sure, it's got boingy friction shocks and it doesn't even crack 20mph, but I still love the Super Fighter G. It channels the spirit of Tamiya classics like the Frog and Hornet with its rugged construction and fun-loving nature, and it's inexpensive and easy to build—a perfect combo for do-it-yourself minded beginners. And once built, there's plenty of upgrade potential. It'll never be a true racer, but the transmission can handle much more power, the 2.2-inch rear wheels will accept a wide range of aftermarket tires, and oil-filled shocks are an easy upgrade. So get one and go crazy! I'll be Hoppin' Mad if you don't, because Being Nuts Is Neat! You long-time Tamiya fans know what I'm talkin' about.

Distance (in feet) traveled in:	0-132 ft. time	Speed at 132 ft.
1 50C.) 10.3 2 50C.) 31.4	E.Z.	큶
3 58C.) 54.7 4 58C.) 78.6	Time to top speed	Top speed
5 SEC.) 102.6	날만.	큶

PATINGS

On-power steering

Braking 900000000 E The included speed control gives good braking control.

Bump handling 600000000 5 The friction shocks bottom easily and deliver a harsh ride

Jumping 000000000 5 The SFG gets a 10 on the way up—it's the trip down that cost it points.

Best buyer>>> All first-time kit builders, especially younger guys. Any Tamiya buggy fan.





KIT FEATURES

CHASSIS. The GTR is built on the same 3mm 6061 aluminum slab as the Menace truck. A slim fiberglass upper deck snakes from gearbox to gearbox to support the steering bellcranks and fuel tank and stiffen the chassis. The chassis' screw holes are fully countersunk, of course, but you'll need a Torx driver to work on the car (an L-shaped cheapie is included). The receiver and its battery are stashed in a fully enclosed box that incorporates the servo mounts, so the entire electronics package can be removed as a unit.



DRIVETRAIN. You won't find a drivetrain like this on any other car. Instead of two or three belts or a driveshaft, the GTR wraps a single belt around a layshaft and the front and rear ball differentials. The belt is 10mm thick, and the diffs have steel outdrives, so they're up to channeling the GTR's big-block power. Universal-joint axles outfit all four corners, and clamping hex hubs support the wheels. The hexes are standard 12mm units, so the GTR can wear aftermarket "supersize" wheels—all cool stuff, but pretty much hidden from view. The big feature that does jump out is the 3-speed transmission. You can't miss those three spur gears stacked up like pancakes! The transmission

INCLUDED ELECTRONICS & ACCESSORIES



ACE JAGUAR AM RADIO SYSTEM

I'm not sold on the angledwheel ergonomics, and the system's overall feel is plasticky, but the Jag scores with its adjustable steering dual rate and throttle endpoints (a particularly welcome feature on a nitro car).

ACE S1903 STEERING AND THROTTLE SERVOS

These basic, plastic-gear units are rated for about 40 oz.-in. of torque, and they do a decent

job of controlling the GTR. A little more steering-servo power would be nice, but for the GTR's play mission, the stocker is fine.

GLOW IGNITER AND TOOLS

A D-cell, clamp-type glow igniter is provided (sans battery, of course) with a turnbuckle wrench, Torx and hex "L" wrenches, spare servo horns and the E-Start's required shaft. Air filter oil is not included, but the air filter is factory-lubed.

uses a clever ratchet-and-pawl combination that doesn't require any one-way bearings, but it has a downside: the shift point isn't adjustable. We'll see whether Schumacher got it right when we drive the GTR.



The Thunder
Tiger engine is
reliable and
powerful—
exactly what a
good RTR
engine should
be. Note the
all-aluminum
carb and brass
banjo fitting.
No skimping
here.



The E-Start shaft has a ball end, so you can angle it past the manifold to reach the socket.

SPECIFICATIONS

MANUFACTURER Schumacher MODEL Menace GTR SCALE ¹/₈ PRICE \$500 Varies with dealer

DIMENSIONS

Wheelbase 11.22 in. (285mm) Width 10.2 in. (260mm)

WEIGHT

Total, as tested 84 oz. (2,381g)

CHASSIS

Type Double-deck plate
Material 3mm 6061 aluminum
with fiberglass upper deck

DRIVETRAIN

Type Full-time 4WD, single belt Primary 3-speed clutch bell/ spur gear

spur gear Transmission ratio (1/2/3) 4.33:1/3.21:1/2.47:1

Driveshafts (F/R) Universal joint Differentials Ball-type with steel outdrives

Bearing type Rubber-sealed ball bearings

SUSPENSION

Type Lower H-arm with turnbuckle upper link Shocks Aluminum body with adjustable pistons, clip-on preload spacers

WHEELS

Type 18-spoke chrome

TIRES

Treaded rubber with glued foam inserts

ENGINE & ACCESSORIES

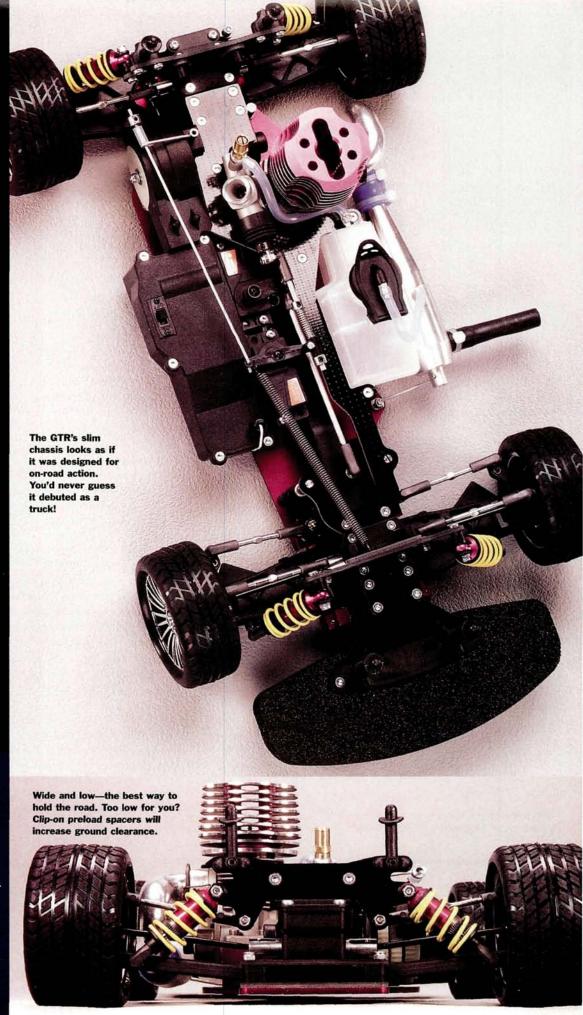
Engine Thunder Tiger Pro .21
with starter shaft
Clutch 2-shoe with waist spring
Manifold Tubular aluminum
Pipe Turned aluminum
Fuel tank 125cc primerless
with sintered filter

ELECTRONICS

Transmitter/receiver Ace Jaguar 2-channel AM Servos Ace S1903 Receiver pack Not included

FACTORY OPTIONS

- Aluminum parts
 - Brake hub and ratchet—item no. U2780
 - Shock-seal housing (pair)—U1818
 - Rear hub carriers—U2653
 Front C-hubs—U2648
 - Steering knuckles—U2652
 - Front suspension mount-U2651
 - Front suspension arms— U2649FR
- Carbon shock towers (F/R)-U2816/U2815
- Carbon top deck-U2817
- Titanium shock mounts (4)—U2781
- High-speed 21-25-29 clutch bell--U2553





With big-block power and a 3-speed tranny, the GTR is bound to be fast, so it had better have good brakes. And it does, in the form of thick graphite rotor and steel caliper plates mounted behind the spur-gear stack.

SUSPENSION AND STEERING. The GTR wears the same wide-track arms as the Menace truck, so it should have major roadholding capability. The suspension design is classic RC stuff: Chubs and steering knuckles with turnbuckle camber links and tierods. Schumacher's turnbuckles are steel look-alikes for Lunsford units, so they're thicker and stronger than most other RTRs'.

The suspension puts the squeeze on aluminum shocks with

gammininamin mark

Steel clamping hex hubs are an unexpected touch, and the turnbuckles are extra-thick.

clip-on preload spacers. The shocks use Schumacher's trademark Vari-Piston design that lets you select the number of open holes in the piston, but you have disassemble shock to make the adjustment. More useful is the volumecompensation system that uses a foam insert to absorb and release the fluid displaced by the shock shaft. It's a system other brands have now adopted, but Schumacher did it first.

ENGINE AND ACCES-SORIES. Like all of Schumacher's big-block machines, the GTR is powered by a Thunder Tiger Pro .21 engine. It's a chrometime-tested, sleeve, 3-port mill that's well known for its reliability, and its 2-needle carb lets you make precise mixadjustments. ture Schumacher includes a lubed air filter to keep it

tact the manifold. PINCH PREVENTER removal easier.

The GTR body has a closely fitting hole for the exhaust stinger, and I found myself inadvertently shutting down the engine as I tried to tease the soft rubber stinger through the opening when I mounted the body. The fix is simple: just snip the hole so it becomes a slot. The hole is already close to the edge of the body, so the slot doesn't look hack, and it makes body mounting and

breathing clean, and a tubular manifold routes exhaust gases through a small (by big-block standards) tuned aluminum pipe. You won't find a pull-starter; instead, there's a socket for the supplied E-Start starter shaft (you supply a cordless electric drill to spin it). Fuel is carried in a 125cc primerless fuel tank with a sintered filter and a cap-mounted pressure tap that reduces fuel foaming. The finishing touch is a throttle return spring—a 10-cent item every nitro vehicle should have, but most don't.

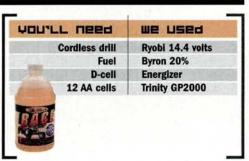
BODY, WHEELS AND TIRES. Frewer supplies the McLaren GTRinspired body shell, and it's painted and trimmed for you, but you have to install the wing. The window decals are already on the shell, but the detail stickers are left for you to apply. The wheels have a turbine look with their 18 chrome spokes, and Schumacher has glued the rubber to them for you. The tires are supported by foam inserts and have a deep, street-tread pattern that should cope well with dusty parking lots.

LIKES

- > Fast and furious parking-lot performance.
- > Fully enclosed belt stops pebble jams.
- Convenient shaft-starting.

DISLIKES

) Shaft starter can chew up the manifold if you aren't careful.



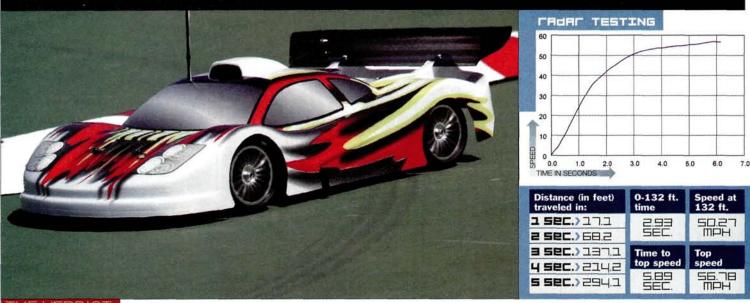


PERFORMANCE

"Don't forget the power drill!" That's what the Post-it on my toolbox read, and after retrieving it from the debris of my latest wife-induced remodeling project (damn you, HGTV!), I was ready to give the GTR its shakedown cruise. Straight from the box, the Thunder Tiger Pro BX engine fired with the first squeeze of my Ryobi's trigger, and I was ready to rip-or gently rip, at least, since the engine had to go through break-in. It was hard to resist the urge to dig deep into the trigger, since the Mayhem was so clearly going to scream. Three tankfuls later (that was all the waiting I could handle), I let the engine unspool to redline for the radar. The 3-speed's fixed shift points seem well chosen; the car jumped up to the next gear just as the engine's power band began to taper. When in third gear and nearing full throttle, the Mayhem reaches nearly 60mph and pushes the limits of the Ace radio system's range. It may even be able to top sixty, but I simply ran out of radio! At the end of each run, I gave the brakes a good workout and found them very strong yet easy to control. Their power faded quickly as the parts broke in, but readjustment restored performance.

At low speeds, the Mayhem's narrow front tires and wide track give it aggressive steering, and its high power-to-weight ratio makes it easy to bring the car's rear end around. If you're nimble with your steering fingers, the Mayhem can be a highly effective drifter. All the power you could ever need to keep the rear tires slipping is on tap, and the 4WD system keeps you in control. As speed increases, so does grip, and the Mayhem becomes less and less likely to oversteer as the digits roll up. At full speed, the Frewer GTR shell and its huge rear wing press the rear wheels to the ground so firmly that sawing at the steering wheel barely made the car's nose wiggle. Suffice it to say, you are in no danger of spinning out during a speed run. If, however, you need to make a quick move at high speed, you can forget it. So be careful about trying to thread through a gap between parking blocks at 50mph+!

The Mayhem GTR sorta looks like the Coyote from "Hardcastle and McCormick" (Google it), so it only seemed fitting that I do some Hollywood-style, dusty burnouts in the sandy corners of the parking lot. Park the GTR in the sand, squeeze the trigger and BWAAAAHit's Brian Keith and the other guy on a cheesy crime-busting adventure. It's also a good test of the GTR drivetrain's contamination-resistance, and I was happy to find that my dirt-burnout abuse never fouled the car's drive belt.



THE VERDICT

PRTINGS

The Menace GTR just might be the perfect parking-lot car. It's big-but not too big-so it looks extra-impressive as it does its thing, and its wide track and high-downforce body give it plenty of pavement-grabbing grip. During a day of testing, the Thunder Tiger engine always started easily and ran reliably, even with less-than-perfect carb tuning, and the E-Start system is much more convenient than a pull-starter (and, unlike an onboard sys-

tem, it doesn't require a stick pack and a charger). As much fun as the GTR is straight from the box, I appreciate its hop-up potential. Schumacher offers numerous graphite and aluminum upgrades, and there's even a "high-speed" gear cluster (as if the car was "slow" before!). In all, the Menace GTR is a great way to burn off an afternoon and a quart of fuel.

Parts fit and finish ••••••• E Very good overall; nothing lavish.

Turn-in OOOOOOOO

With its wide track and plump-sidewall tires, the GTR has a lot of bite.

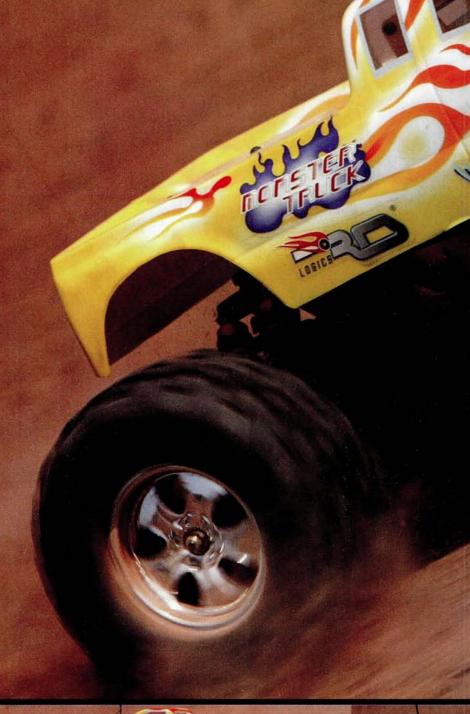
Corner speed 000000000 E Drifts wide, so you have to slow to hold a tight line—but drifting is more fun.

Best buyer>>> Any on-road nitro guy.

It looks like a Savage, but the Wolverine has claws of its own

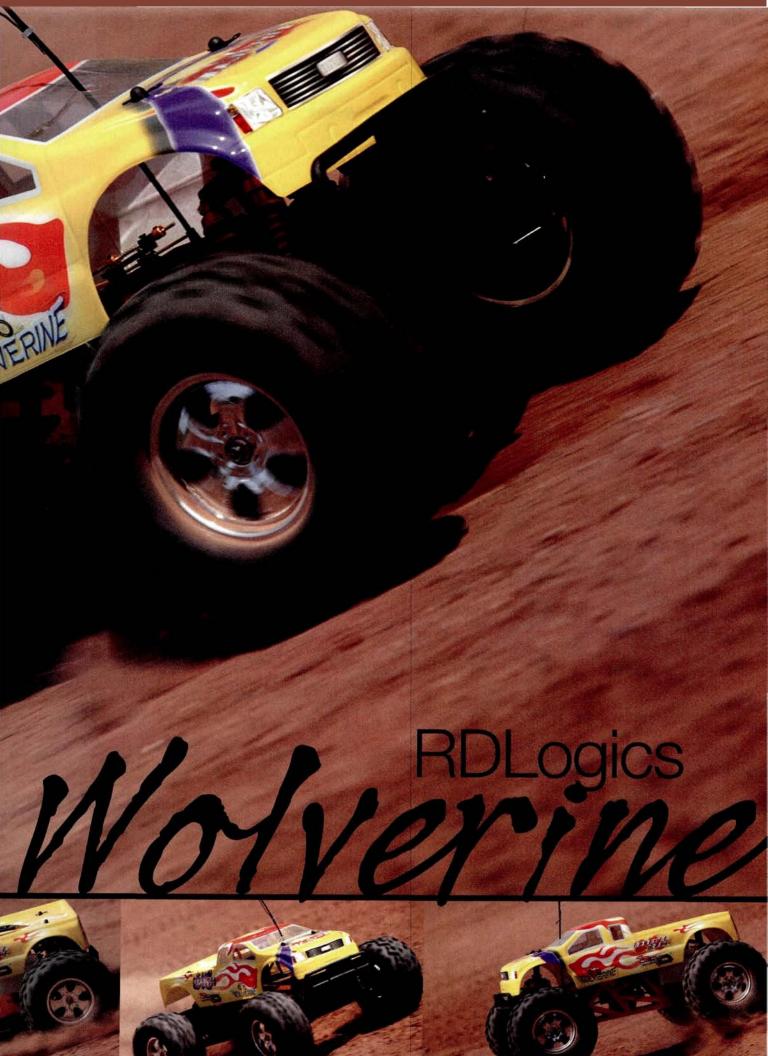
What? Are you kidding?

The Wolverine is nothing like an HPI Savage; the Savage doesn't come in gold! OK, so maybe RDLogic's new Wolverine does look a lot like a Savage, but that doesn't change the fact that it's loaded. With its .27 engine, mega-torque steering servo, cavernous 270cc fuel tank and a steel-gear drivetrain, the Wolverine is built for bear. And its Savage-like features are well executed-in some cases, it even improves on the Savage formula (aluminum shocks instead of plastic are the biggest standout). Ready to drive? It's clobberin' time! Actually, that's The Thing's catch phrase, not Wolverine's, but who cares? It's still clobberin' time!









KIT FEATURES

CHASSIS. A pair of 3mm, 6061-T6 aluminum plates sandwich the radio box, engine and transmission in the same configuration as a Savage's, but the Wolverine's radio box is roomier, and its body clips are much easier to access. It also has a Savage-like roll bar/carrying handle, but instead of a single strip of sharp-edged flat stock, the Wolverine version uses a pair of easy-on-the-fingers aluminum tubes for the handle. Triangular, solid-aluminum joists secure the engine plate, while broad skidplates and oversize bumpers protect the drivetrain and suspension.

DRIVETRAIN. No vehicles are as hard on their drive systems as monster trucks are, so a tough transmission is a must. With all-metal gears and a single-pad slipper clutch, the Wolverine has this base covered, so it should be just about destruction-proof. There's no reverse, but you do get a pawl-type 2-speed. A rubber plug in the transmission's side gives access for shift-point adjustments.

Braking power comes from a pair of steel rotors and unpadded steel calipers. At 35mm in diameter, the rotors are certainly monster-size, but they're very thin—just under 1mm. We'll just have to see how they hold up on the track.

The transmission is linked to front and rear six-gear differentials by 4.5mm steel dogbones, and identical dogbones reach from the diffs to the stub axles; sorry, no universal-joint axles. The axles are capped by 14mm drive hexes, so you can mount any Maxx-type wheel, and rubber-sealed bearings keep everything spinning smoothly and dirt-free.

SUSPENSION AND STEERING. All of the Wolverine's molded suspension parts look chunky and chiseled. The lower H-arms and upper I-arms are a full centimeter thick, and the I-arms are fitted with 5mm steel turnbuckles that have 10mm flats; you'll have no trouble keeping a wrench on those bad boys! The hub carriers and steering arms are universal; there's no right/left or front/rear to keep track of. That also means the Wolverine has adjustable rear toe. Steel, 3.5mm turnbuckles hold the settings, and identical units steer the front wheels. The turnbuckles are attached to a stamped-aluminum drag bar and plastic bellcranks (that look a bit spindly). The bellcranks do not incorporate a servo-saver; instead, it's mounted directly on the servo and is therefore nonadjustable.

Threaded, aluminum-body shocks do the damping; there are two per corner for the 8-shock look. They use a conventional, dual O-ring/bladder design with bottom-loaded seals and 3mm shafts. Thicker 3.5mm shafts would be better, but with loads spread over 8 shocks instead of 4, the 3mm shafts should hold up fine.

INCLUDED ELECTRONICS & ACCESSORIES

AIRTRONICS BLAZER SPORT TRANSMITTER

Like many RTRs, the Wolverine comes with the proven Blazer Sport radio. Although it isn't the most high-tech radio available, it does include steering dual-rate and has very good range for an AM system. Three LEDs indicate the battery's

monster. You'd spend about \$75 to \$100 to upgrade most other RTRs with a servo this good.

AIRTRONICS 94102 THROTTLE/BRAKE SERVO

It doesn't require much torque to open the throttle and pull on the brakes, so an Airtronics 94102 standard servo got the



charge level, and a charging jack allows the use of rechargeable cells.

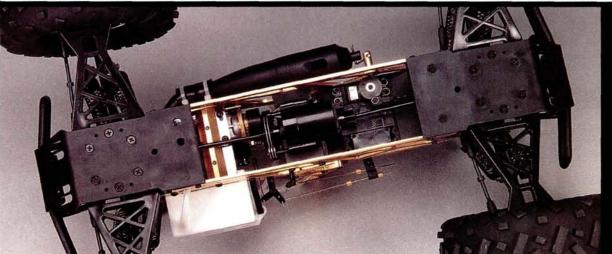
AIRTRONICS 94162 STEERING SERVO

Wow. Just in case you don't have Airtronics' servo specs memorized, this servo is good for a whopping 154 oz.-in. of torque! We're happy any time a manufacturer specs anything better than a 40-ounce standard servo, but RDLogics went over the top with this metal-gear

job. Hey, they have to offset the cost of the super steering servo someplace!

TOOLS & ACCESSORIES

RDLogics helps get you going by supplying a 250cc fuel bottle, dry-cell glow starter and a 4-way wrench. There are even spare head shims and a bottle of filter oil. It's amazing how many RTRs skip the filter oil!



The chassis plates extend past the exposed drivetrain parts to protect them from damage while wide skidplates shield the suspension and gearboxes.

SPECIFICATIONS

MANUFACTURER RDLogics MODEL Wolverine SCALE 1/8 PRICE \$400 Varies with dealer

DIMENSIONS

Wheelbase 14.5 in. (368mm) Width 16.25 in. (413mm)

WEIGHT

Total, as tested 182 oz. (5,144g)

CHASSIS

Type Twin, vertical aluminum plates Material 6061-T6 aluminum

DRIVETRAIN

Type Twin diff, full-time 4WD Primary 18T pinion/ 46T spur Transmission ratio 8.63:1 (1st)/5.89:1 (2nd)

Final drive ratio 22:1 (1st)/

15:1 (2nd)

Driveshafts Dogbones

Differentials Grease-filled bevel-gear

Bearing type Sealed ball bearings

SUSPENSION

Type Lower H-arms with adjustable turnbuckle upper links Shocks Aluminum-body, fluid-filled, threaded

WHEELS

Type Chrome-plated plastic 5-spoke

Type RDLogics big-block tread

ENGINE & ACCESSORIES

Engine Team Infinity RTR27 .27, 2-needle slide, rear exhaust, pull-start

Clutch 3-shoe

Manifold Spring-retained tubular Pipe Aluminum, tuned

Fuel tank 270cc primerless

ELECTRONICS

Transmitter/receiver Airtronics **Blazer Sport**

Steering servo Airtronics 94162 Throttle servo Airtronics 94102



Left: the large bumper and skidplate are sure to take a beating. The tall tires give all-surface traction and increase the Wolverine's ground clearance.

Right: eight shocks damp the big rig's ride, and turnbuckles in the upper arms set camber.



TRACK TEST RDLogics Wolverine



.27 engine gives the truck plenty of wheelie-popping power, but the idle screw is difficult to get at because of the header's position.

ENGINE AND ACCESSORIES. The Wolverine's Team Infinity powerplant is a basic chrome-sleeve, 3-port design, but the crank and sleeve have some additional port work to help fuel flow through the engine. Most of the power no doubt comes from sheer size; at .27ci, it's among the biggest you can get in an RTR. A heavy-duty pull-starter fires it up, and the engine breathes through a composite-plastic, dual-needle slide carb with an unusual multipiece body; let's hope that it's well-sealed!

The engine mates to the chassis with nicely machined, aluminum engine mounts, and a buggystyle, 3-shoe clutch and steel clutch bell link it to the transmission. The clutch bell spins on rubber-sealed ball bearings-no skimping on plain bearings or a plastic-caged roller unit.

A black-anodized tuned pipe and tubular header are mounted high on the right side of the truck so as to stay outside of harm's way, and an enormous 270cc fuel tank hangs off the chassis' left side. The tank is unique in that it straddles the chassis plate to create two deep reservoirs. Fuel tubing links the halves so both can feed the pick-up, and an internal sintered filter keeps the fuel clean.

BODY, WHEELS AND TIRES. The Wolverine rolls out on beautifully plated chrome wheels and tall-sidewall, heavilly lugged tires with tread blocks that look like pieces of Dentyne. The wheels and tires are factory-glued with a tight bond, but there were a few smears and fingerprints in the glue job. Still, it's a lot neater than what most of us wind up with when we do the job

Savage versus Wolverine Just how much does the Wolverine crib from the Savage? It steals

styling cues, but not much else-check the specs for yourself.

	HPI Savage 25	RDLogics Wolverine
Wheelbase	340mm	368mm
Width	426mm	413mm
Weight	7,037g	5,144g
Ground clearance*	102mm	86mm
Suspension travel**	117mm	104mm
Engine	.25	.27
Starter	Rotary	Pull-start
Price	\$400	\$400

Distance from ground to highest point on chassis' underside with arms at full droop

THE COMPETITION*

VEHICLE >> REVIEWED

Associated Monster GT >> 12/03 HPI Savage 25 >> 7/04

Kyosho Mad Force >> 8/02

Tamiya TNX >> 1/04

Team Losi LST >> 11/04



ourselves. The body is neatly trimmed and mounted but looks shoeboxy. Precut decals are included to dress it up, but they're pretty tame.

UNING

GREASE THE TRANSMISSION PLUG.

It's a really tight fit-so tight that the handle ripped off when we tried to pop the plug. Carefully pry out the plug, smear just a little grease around it and then press it back in. Next time, you can use the handle to pop it out.

RIGHTY TIGHTY? Not on the slipper clutch! The adjustment nut is left threaded. You have been warned.

LIKES

-).27 power.
- Metal-gear, high-torque steering servo (Yes!).
- > Roomy radio box.

DISLIKES

- > Stiff suspension.
- Idle screw is hard to get to.



^{**}Full droop to full compression

PERFORMANCE

The Wolverine started easily but developed a stalling problem during break-in that we traced to a bad glow plug. It isn't unusual to waste a plug during break in, so no foul. After break-in, it was time for radar testing, and the Wolverine showed it could move out with the best of them. Acceleration was strong, and by the time the engine wound out in second gear, the gun's LCD was flashing 40.37mph. Hauling the big truck down from top speed was taxing on the brakes, however, which faded quickly. Once readjusted, they were powerful and consistent, and the thin rotors weren't a problem. Our only complaint is that the brake tends to occasionally hang up and drag. Not a fun-stopper, but annoying.

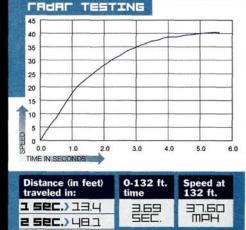
When we hopped a curb to blast a soccer field, the Wolverine proved to be a wheelie machine, thanks to the .27 engine's low-end kick. We had a blast driving the truck up the grassy hills near the area, wheelieing on the way up and tearing down full throttle. During high-speed passes across the field, when the tranny shifted, there was only a slight tone change in the engine noise; it shifts smoothly. The 2-speed was set to kick in about ½ throttle. You definitely have to be on your toes when driving this truck at speed. If you jerk the steering too much one way or the other, you can easily flip it over on the grass or pavement. In the dirt, the truck had good turn-in but pushed through turns when on power as it lifted its inside front tire. The steering servo is incredible; it has plenty of torque to turn the tires even when the truck isn't moving. But on the downside, the servo-saver is soft and steals some steering precision.



We topped off the fuel tank (which took a long time to drain; it's great to have 270cc on tap) and headed over to a rough section full of rocks and tree roots to see how the suspension would react. The suspension is a bit on the stiff side, and while that's good for absorbing big hits, it also causes the truck to bounce uncontrollably at times. That can be fixed by adding lighter shock oil, but for backyard bashing, stiffer is probably better.

We broke out a plastic skate ramp for jump testing and gave the Wolverine a bunch of frequent fyer miles. The front end bounced a little on the landings, but it wasn't enough to disrupt the truck. If you nail the gas at the right time, you can ride sick wheelies after the truck lands.

The Wolverine took its fair share of misaligned launches and wrecks, and came out unscathed. We were worried about the exposed fuel tank and throttle/brake linkage, but they're well protected by the suspension and wheels. It's a tough truck.



OFIND IT

3 SEC.> 94.9

4 58C.) 149.2

5 SEC.) 206.8

)>) Go to page 225 for manufacturers' contact information

Time to top speed

Top

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THE VERDICT

As monster trucks seem to get racier, it's good to see a truck so unabashedly backyard-bash-worthy as the Wolverine come along. With its tall tires and stiff suspension, this truck is all about full-throttle, anything-goes, off-road action. Not that RDLogics has forgotten performance; the Wolverine's .27 engine really kicks, and the included high-torque steering servo is a

major bonus. Every RTR should be so well equipped! A weak steering servo brings down the fun factor a notch, but overall, the Wolverine is a worthy addition to the long-list of nitro monsters any savvy shopper should consider. It may look like a Savage, but the RDLogics Wolverine has claws of its own.

BATTERY USARIAN

What's your strategy for speed and domination?

BY STEVE POND | PICS BY PETE HALL



FOR SOME OF US, battery packs are little more than a means to an end. We need them to power electric vehicles, and most of us know that the packs with the bigger numbers cost more but offer longer run times. Start racing, however, and the details become important. You need more power, and you should know what you're getting for your money. With that in mind, we put the latest generation of NiMH batteries through a battery of tests to determine how they perform and what you can do to make them run strongly for as long as possible. Don't buy a battery before you read this!



GOLD PEAK 3300

Now in its third generation (evo 3), the GP3300 cells appear to be the only race-legal NiMH cells that are still widely available.

The GP3300s are decent cells, but resistance and durability have improved with each generation. Our test packs may have been on the shelf for a little too long, as the voltage and internal resistance were out of sync with those of the other "fresh" cells we tested. The voltage tested a little low, but the discharge curve, like the new 3700 cells', is relatively flat. This provides more consistent performance throughout the run. Run times average about 425 seconds with an average voltage of 1.146. Internal resistance is about 3.2 milliohms.

The GP3300s should be completely discharged before they're charged. This discharge drains off any residual charge and prepares the pack for a full charge. If the pack has been sitting for more than a week, it's best to cycle it a couple of days before you run it. Dead-shorting, though not recommended by the manufacturer, can increase voltage at the cost of a little run time. Avoid long-term dead-shorting, as it may hasten the reduction in cell capacity.

Average voltage: 1.146

Internal resistance: 3.2 milliohms

Run time: 425 seconds Discharge rate: 30 amps Milliamps per hour: 3541 Milliwatts per hour: 4057

Length: 43.2mm Diameter: 22.6mm Weight per cell: 63.15g



GOLD PEAK 3700

These early GP3700s cells show a lot of promise and better performance numbers across the board; they have a higher capacity, a higher voltage and lower internal resistance than the GP3300s. The 3700 showed the second-highest voltage, and it puts out more miliwatts per hour than all except the IB3800 cell. Its discharge curve is also the most linear, and that makes speed and performance more consistent. They're a strong all-around choice when racing rules allow packs of their capacity.

Like the 3300s, the GP3700s should be discharged before they're charged. You can run them a few times a day, but after their second charge, they have slightly less performance to offer. They respond well to deep discharging and dead-shorting, but if you plan to store them for longer than a couple of weeks, you need to charge the pack and then cycle it once a month.

The GP3700 cell has a larger diameter and is slightly heavier than the GP3300. Their diameter makes assembled sideby-side packs longer, so you need to be sure your car can accommodate these cells.

Average voltage: 1.156

Internal resistance: 3 milliohms

Run time: 438 seconds Discharge rate: 30 amps Milliamps per hour: 3681 Milliwatts per hour: 4182

Length: 43.2mm Diameter: 23mm Weight per cell: 65.78g



INTELLECT BATTERY 3600

Made by Intellect Battery, the IB3600 cells are about the same size as GP's cells and others, so they're compatible with virtually any vehicle that can accommodate the GP3300. Their performance is very good, but they don't appear to be as tough as the GP cells. The internal resistance is low, as is the average voltage. The discharge curve is less linear, so the cells feel a little more powerful up front and then taper off just a fraction more at the end of the cycle (a little more than the GP cells did). These batteries don't respond well to dead-shorting or deep discharging, so keep a little juice in them between rounds.

Average voltage: 1.138

Internal resistance: 3 milliohms

Run time: 412 seconds Discharge rate: 30 amps Milliamps per hour: 3385 Milliwatts per hour: 3807

Length: 43.2mm Diameter: 22.3mm Weight per cell: 63.12g



INTELLECT BATTERY 3800

The IB3800s (also available as Epic 3800s) are similar in size to the GP3700, so they might not fit some cars. Initial tests showed a little less run time and total power output than with the GP3700, but subsequent packs showed the best overall performance. The internal resistance is the lowest, and the average voltage is the highest at 1.158. But their key feature is performance: the cells have a lower internal resistance, so they give lots of punch, and their voltage is very good. Like the 3600, the 3800 doesn't have as linear a discharge curve as the GP cells, but that's overshadowed by its big voltage, long run times and low internal resistance. The early information on these new cells is similar to what we know about the IB3600; charge at a normal 5 to 6 amps, discharge at a more conservative rate and don't dead-short them.

Average voltage: 1.158

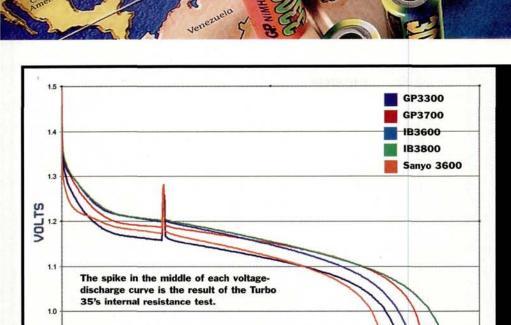
Internal resistance: 2.8 milliohms

Run time: 462 seconds Discharge rate: 30 amps Milliamps per hour: 3798 Milliwatts per hour: 4385

Length: 43.2mm Diameter: 22.9mm Weight per cell: 66.48g



NIMH CELLS HAVE A LIMITED SHELF LIFE; IN FACT, IT'S BETTER TO USE THEM THAN TO LET THEM SIT.



LARGE AND DISCHARGED

The discharge curve of a battery pack gives you a visible way to compare packs' performances. The old Sanyo 3600 shows an OK voltage curve, but it falls short on time (as we expected of a pack that had been idle for a while). The GP3300 drops to a lower voltage level early in the discharge cycle, but it has a higher average voltage and longer run time. The IB3600 has the second-highest voltage early in the first half the cycle, but after the halfway point, its voltage drops below that of the GP 3700. The GP3700 is a big gun with more run time and higher voltage than the GP3300 and the IB3600. The class of this field is the IB3800. It produces 460 seconds of run time at a 30A discharge rate (almost 500 seconds on the Turbo Matcher), and the 3800 has the lowest internal resistance and the highest average voltage. These are early production cells, and they'll be formidable if the later production cells are as good as the ones we tested.



TIME (IN SECONDS)

Testing cells is an inexact process because the results can vary, but it's certainly worth the effort. It gives you more data and might even give you the edge you need to stay at the front of the pack. All the cells we tested were relatively new (less than a month old, except where noted) and were subjected to the same charging and discharging.

Before we cycled the cells, we discharged each on an INDI ZeroThirty-030 discharger. This removed any residual charge and prepared each to take a full charge. The cells were cycled on a CE

Turbo Matcher 4 and a CE Turbo 35 GFX—both powered by an ultra-precise HP 120A power supply that provides a very consistent, clean DC current.

The cells were cycled on the Turbo Matcher 4 to get data on a higher volume of cells, but all the data shown here was obtained using the more versatile Turbo 35 GFX. The GFX allows charge and discharge data to be logged and displayed in a spreadsheet for analysis. The average voltage, internal resistance and run times were a little lower on the Turbo 35 GFX than on the Turbo Matcher 4, which is probably the result of the extra wires and connectors needed to attach the battery cradle to the GFX. The numbers, though lower than average, are all relative and only for comparison. The numbers provided by one matcher may vary.

The cells were cycled twice a day and given two days to rest between the first five cycles followed by two, one-week rest periods. This was to determine whether there's a consistent, measurable difference if you allow a pack to rest longer; there isn't. No cells were dead-shorted, but to ensure a full charge, they were fully discharged before each cycle.

SANYO 3600

0.9

Although Sanyo technically still offers the 3300 and 3600 cells featured here, they aren't widely available to most RC racers. The initial 3600 cells showed real promise: factory labels showed run times of 425 seconds at 30 amps and decent voltage, but the production cells showed higher internal resistance and shorter run times. The resistance was enough to reduce punch to less than that offered by the GP3300; and they don't have the voltage for stock racing. This Sanyo cell didn't turn out well, but don't count it out. Sanyo is a well-known manufacturer of powerful, reliable cells, so we can be sure that new cells are being developed.

Average voltage: 1.136

Internal resistance: 4.2 milliohms

Run time: 387 seconds Discharge rate: 30 amps Milliamps per hour: 3372 Milliwatts per hour: 3712

Length: 43.2mm Diameter: 22.5mm Weight per cell: 59.89g



Use it or lose it

better to use them than to let them sit. We asked an engineer at one of the manufacturing companies to explain this, and he surmised that the longer cells sit and rest, the greater is the likelihood of a chemical reaction that leads to crystallization and a loss of cell capacity. This is apparently a greater risk when a pack is stored with less than 1 volt in each cell. In as few as three months, unused NiMH packs can show a permanent loss of capacity and voltage. The cells' internal resistance can increase until they can't be charged on certain peak-detection chargers because there isn't any detectable voltage left in them.

So how can we keep our cells performing at their best? Start with a fresh pack—not one that has been collecting dust on a shelf. When cells have lost some of their capacity, there's no getting it back. If you hope to get your money's worth out of NiMH packs, you have to use them. Don't buy 10 racing packs at once; buy two packs at five different times throughout the season. Then you'll be able to switch between them to keep them fresh, and you'll always have fresh packs to run in the Mains.

What happened to Panasonic and Sanvo?

The two biggest battery manufacturers in RC for the last 25 years, Sanyo and Panasonic, have almost disappeared from the RC landscape, or so it seems. There's no denying that these two giants have taken a back seat in the NiMH RC market; as fast as both battery behemoths jumped into that market, they got out. There's no official word on future offerings from the two companies, but we're told they have projects in the works that may result in new offerings. They aren't included in this article (other than to show that the latest Sanyo offering doesn't measure up to the competition) because they aren't "in" the market right now. These two battery giants have a lot of R and D muscle, so if and when they decide to jump back in, there's a good chance that they'll rock the boat, but for now, it they're on the sidelines.

IT'S ALL IN THE NUMBERS

Matching your cells was essential when winning depended on the quality of your battery pack. The cells' consistency and capacity weren't as high as they are today; packs containing only the better cells offered a considerable advantage for those who were lucky enough to get a "good" one. Today's packs have so much more capacity, and according to a few notable manufacturers, their consistency is better than ever. The packs' capacities are almost beyond the motors' capability to drain them in the allotted time (notice I say "almost"), so there isn't as much emphasis on run time as there is on internal resistance and voltage. The extra data now provided by battery suppliers means that you can choose your battery packs to suit your type of racing.

RUN TIME. This is how long your pack will last at a fixed rate of discharge. For example, most packs are matched at a discharge rate of 30 amps, so a pack that has a discharge time of 425 seconds will run for 425 seconds when it's drained at a steady 30 amps.

CHARGE RATE. This is how fast the juice is pumped into a pack. A charge rate of 5 amps is average, but different rates may be used. Changing the charge rate can also alter certain pack numbers, so by altering the rate, you can manipulate the numbers. Higher amp rates tend to reduce run time but increase average voltage. Conversely, lower amp rates increase capacity but offer a lower average voltage.

DISCHARGE RATE. This is the rate of discharge used when evaluating cells on a matching system. For a long time, the standard rate was 20 amps, but it's now 30 amps. Certain cell matchers use higher rates, and others use lower rates, but 30 amps is the standard. The discharge rate affects the average voltage and run time. Lower discharge rates tend to produce exponentially longer run times and higher voltage, while higher discharge rates exponentially reduce average voltage and run time.

MILLIAMPS PER HOUR (MAHR). This number tells you how many milliamps a pack can put out per hour. It's measured in the same units as the batteries are rated; for example, the GP3700 cells we tested are rated at 3700mAh. If a cell's tested capacity was 3852mAh, it did slightly better than rated.

MILLIWATTS PER HOUR (MWHR). Checking the milliwatt hour is the most accurate way to rate a pack's total power output. It takes the MAHR rating a step further by also factoring in voltage. Two packs that have the same measured MAHR capacity could produce different MWHR ratings because one has a higher average voltage. The pack with the highest MWHR will be the most powerful pack.

INTERNAL RESISTANCE. How easily energy flows into and out of a pack is quantified by measuring its internal resistance (IR). The number tells you how much punch a pack can deliver. Lower-IR cells are better for stock-class racing because there's a motor limit; cells with lower IR will deliver more punch. Modified racers might benefit from higher-IR cells. Their higher resistance reduces the number of hard amperage spikes that can result if you have a twitchy trigger finger and a really low-turn mod motor. You can always run low-IR cells in modified, but you risk depleting the pack more quickly if you aren't a smooth driver. Racers seem to think that they always need the cells with the lowest IR. A motor and battery guru on one of the hottest teams says they print low-IR labels for certain team drivers who think they absolutely have to have a low IR; but, in fact, their cells have a slightly higher IR because they work better in many circumstances.

VOLTAGE CUTOFF. This is the point at which the timer stops measuring the discharge time. The run time indicated on the label of a matched cell shows how long it takes the pack to be discharged from its peak voltage down to a typical value of 0.90 volt (when the pack's voltage is below a useful level).

TODAY'S PACKS HAVE MUCH MORE CAPACITY, AND ACCORDING TO A FEW NOTABLE MANUFACTURERS, THEIR CONSISTENCY IS BETTER THAN EVER.

HOW TO CHARGE NIMH PACKS

Charging has always been the source of much discussion. Matched packed are more expensive, so racers don't want to harm them by charging them improperly. The techniques used are evolving, but here's the best advice we and certain battery experts could come up with.

CHARGE AMPS

Despite what you may have seen at the track or read on an Internet forum, no one charges his pack at 12 to 14 amps. That would kill it and create a dangerous situation in which there's a risk of the cells' venting because they're over-charged. Have you seen two chargers connected to one pack? If you think they were pumping in more juice than is possible with one charger, you've fallen for the oldest trick in the book. It's as a hoax designed to freak out the competition. Charge current NiMH packs with a capacity of 3300mAh or more at 5 to 6 amps.

VOLTAGE CUTOFF

Peak-detection chargers handle the peak-detection setting differently. In some, the delta peak (the voltage drop) is set on a percell basis; in others, it's set according to the voltage drop across the entire pack. For example, a charger that can be set to detect a deltapeak of 0.01 volt would figure that on a per-cell basis. It wouldn't matter whether you had a 4- or a 10-cell pack; the setting would stay the same, and the charger's software would make the conversion. Other chargers ask that you set the total delta peak, or the total voltage drop across the entire pack. So, a 6-cell pack might be set for a delta peak of 0.06 volt and a 10-cell pack would be set for a 0.10V delta peak.

HOW OFTEN CAN YOU USE YOUR PACKS?

NiMH packs need to be used to keep them in top form. Popular opinion on how often to use NiMH packs varies widely, but experience shows that they can be successfully run twice a day. They can even be run a third time, but their performance tends to flatten on the third cycle.

HOW SHOULD PACKS BE STORED?

Opinion on how to store packs varies. Some of the disagreement focuses on how much cells should be discharged and how much of a charge they should be left with. We went to the experts who live and breathe cell technology.

IB3600 AND 3800

SMC's Danny Sullivan gave us some insight into SMC's experience with the IB3600 and IB3800 cells. Sullivan says that if stored for less than a week, the packs work better when they're discharged down to 0.9 volt per cell. They shouldn't be completely discharged until you're ready to charge them fully for racing.

For long-term storage, Sullivan recommends that you charge your packs at the standard 5 to 6 amps for a little more than 8 minutes. This supposedly puts enough charge in the pack to prevent the crystallization that causes a loss of capacity and voltage.

GP3300 AND 3700

According to Rich Hawkes at Trinity, the GP cells are pretty resilient. The 3300 and 3700 can be completely discharged between cycles as long as you plan to run them twice in a day. The dischargers that isolate each cell are more effective than those that discharge the entire pack because with the latter, there's a risk of reversing some of the cells. If you store a pack for any length of time, discharge it down to 0.9 volt per cell. Hawkes encourages us to cycle the packs every couple of weeks, or at least once a month. He doesn't recommend dead-shorting, but some racers do it. He also prefers to discharge at a lower rate (5 amps or less) for a "soft landing" after the shock of being discharged.

CONSTANTLY CHANGING THESE THINGS WILL NEVER CONDITION THE CELLS PROPERLY. CONSISTENCY IS THE KEY GETTING THE MOST OUT OF YOUR PACKS.

Timing is everything

Many team drivers time the peak of the charge cycle so that the pack is topped off very close to when their race begins. Peaking your pack too early has consequences that you might never imagine. According to our battery guru, peaking too early and repeaking makes a pack run "flat." Start charging a pack so that it peaks just before the start of a race, and then throw your car down and go. The pack will have much more punch and overall performance.

OFIND IT

So to page 225 for manufacturers' contact information

Get the most out of your packs. Expert advice

The battery experts of the racing teams seemed to agree that your battery-pack charging, discharging and storage regimen should be consistent. Constantly changing these things will never condition the cells properly. Consistency is the key getting the most out of your packs, so if you hear of a different method that you want to test, try it on your next new pack; don't change everything you do with your used pack.



BY THE RC CAR ACTION TEAM | PICS BY PETE HALL



In last month's issue, we handed the magazine over to you, the readers, for our Readers' Choice Awards. You picked your favorite cars, trucks and gear, without interference from us fussy editors. It was all about you, but now it's time to name the Car of the Year, and it's all about us. So how do we pick a winner? It isn't rocket science; any car we reviewed since the August 2004 issue is up for consideration, and the winner may be chosen for a number of reasons. We might cite its sales success, its value, or its innovation. But sometimes, it just comes down to sheer performance, and this year, no car exemplifies "sheer performance" quite like the Kyosho V-One RRR. It's a no-nonsense competition nitro tourer that proved its mettle by not just winning the IFMAR Nitro Touring Car World Championship but also by dominating the event and sweeping the top five spots with a total of eight V-One RRRs in the 10-car final. When a race car fulfills its mission so successfully, it's an easy choice for Car of the Year.

KYOSHO J-CINZ RRR





The Worlds-winning V-One RRR

Here's the car that beat all comers: Adrien Bertin's personal V-machine. It's packing Sirio power, and the suspension settings have been tweaked to suit the Worlds track, but featureswise, the car is pretty much stock; you can buy all this stuff off the shelf!





Here's Kyosho prez Aki Suzuki accepting the Car of the Year award at RCX. How do we know he was psyched? He sang his acceptance speech!

Don't bother looking too hard for any factory-driver unobtanium; Adrien's Worlds ride is basically off-the-shelf.

adrien's race gear

Engine: Sirio S12TRPI Pipe: Sirio 2611

Fuel: Sirio Tires: GRP

Body: Protoform Mazda 6 Electronics: Airtronics M8





Above: no team got it done at the Worlds quite like Team Kyosho. Eight out of 10 cars in the final were V-One RRRs, including the top-five finishers. Right: "Weeeeeee are the chammmm-pions" Takaaki Shimo, Adrien Bertin and Chris Tosolini wear their K-colors on the podium in Jundiai, Brazil.



SPECIFICATIONS

SCALE ½10
PRICE \$479
Varies with dealer

DIMENSIONS

Wheelbase 10.2 in. (260mm) Width 7.97 in. (200mm)

WEIGHT

Total, as tested 96.9 oz. (2,748g)

CHASSIS

Type Machined plate Material 7075 aluminum

DRIVETRAIN

Type Triple-belt
Primary 16/61T (1st gear)/
21/56T (2nd gear)
Drivetrain ratio 2.00:1
Final drive ratio 7.625:1 (1st gear)/
5.333:1 (2nd gear)

Driveshafts Dogbone
Differentials 6-gear, sealed rear;

front one-way

Bearing type Metal-shielded ball bearing

SUSPENSION

Type (F/R) Double A-arm/lower H-arm with turnbuckle upper link Shocks Threaded, aluminum body with Teflon shaft guides and bladder seal

TIRES

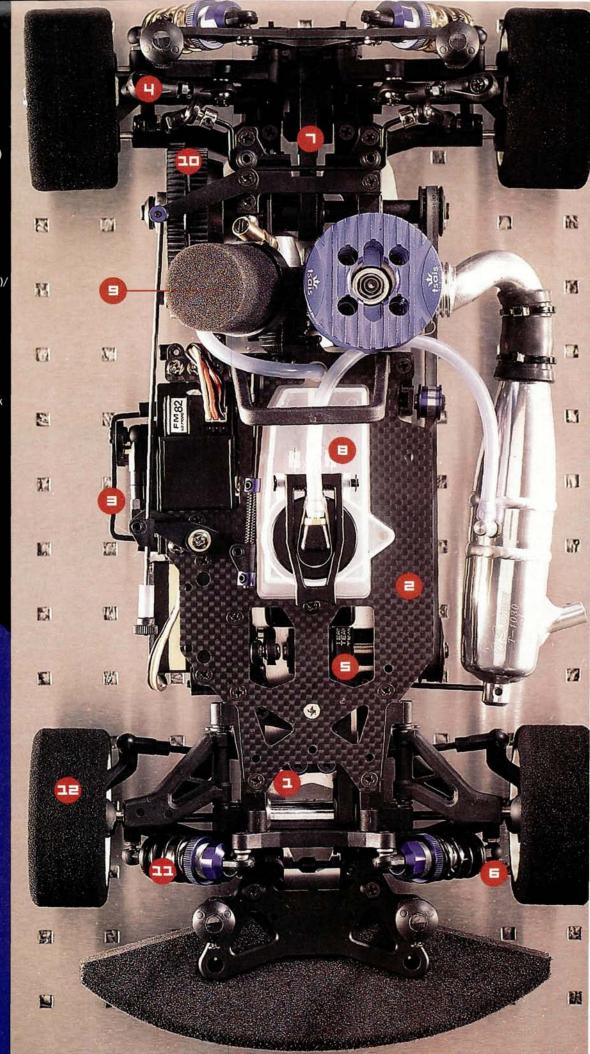
Type Power Tyres 35-shore, zero-offset

ENGINE AND ACCESSORIES

Engine Not included
Clutch 3D Centax
Manifold Not included
Pipe Not included
Fuel tank 75cc primerless
with internal filter

Y-DDE FFF

- 1. 3mm 7075 main chassis
- 2. Lowered 2mm graphite upper deck
- 3. Laydown throttle servo with bash guard
- 4. Pivot-ball suspension with vertical rear ball studs
- 5. 3-belt drivetrain
- 6. Front one-way hubs
- 7. Sealed, 6-gear rear differential
- 8. Central fuel tank with spillway
- 9. 3D Centax clutch
- 10. 2-speed, clutch-type transmission with 0.8-module gears
- 11. Threaded-body shocks with nutted pistons
- 12. Power Tyres 35-shore



TEAM ORION

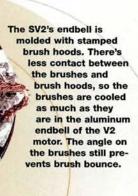
TEAM ORION'S NEW FORMULA SV2 SERIES OF BUDGET MACHINE-WOUND MODIFIED MOTORS is an offshoot of its popular-and more expensive-V2 series of hand-wound modified motors. With the V2 series, Orion introduced cylindrical brushes positioned at an angle to improve brush efficiency and to fully exploit the cooling properties of the aluminum endbells for maximum brush life. The new Formula SV2 (Sport V2) motors feature a similar brush shape and angle, but they feature molded-composite endbells. Will these new motors deliver the same advantages as full-blown modified motors? We dyno'd them to answer that very question.

BUSHINGS OR BEARINGS? SV2s are machine-wound, modified motors designed for budget-conscious racers and bashers. Team Orion created two lines: the Pro Bushing (Pro) and the Pro Ball Bearing (Pro BB). Pro motors are less expensive, but they give up features so they can be offered at the lower price. Besides using bushings to support their armatures, their endbells are fixed. Pro BB motors feature adjustable timing and removable endbells. Both versions come with bullet connectors installed, so their installation in most RTR vehicles doesn't require soldering.

ENDBELL. The SV2's endbell is the motor's most significant feature. Its molded section is very similar to that of the endbells on Orion's Core motors, but the brush hoods that house their brushes and springs are stamped into a triangular shape. The brushes are inserted into the center of the brush hood and contact the commutator at a 45-degree angle. The top of each brush hood features an area where the brush shunt can be hooked. This feature allows the brushes to be pulled out of the way when you remove the endbell for maintenance. The brushes and the brush hood make less contact than the V2's the round brush hoods, so the SV2's brushes may not be supercooled as they are in the V2. The angled brush hoods reduce brush bounce just as they do in the V2.



- Molded SV2 endbell.
- Factory-installed capacitors.
- Angled brush hoods to minimize brush bounce.
- Bullet connectors for easy installation
- Balanced armature for smooth running.
- Cylindrical brushes.



AVAILABLE WINDS

AVAILABLE FORMULA SV2 PRO WINDS

ORI21035: 10x2

ORI21036: 11x2

ORI21037: 12x2

ORI21038: 13x2

ORI21039: 14x2

ORI21040: 15x2

ORI21041: 17x2

ORI21043: 19x2

ORI21044: 21x2

ORI21045: 23x2

AVAILABLE FORMULA SV2 PRO BB WINDS

ORI22031: 10x1

ORI22032: 10x2

ORI22033: 11x2

ORI22034: 12x1

ORI22035: 12x2

ORI22036: 13x3

ORI22037: 14x2

ORI22038: 15x2

ORI22039: 17x2

ORI22040: 19x2

AVAILABLE BRUSHES

ORI41330: SV2 brush (41092)/spring (41392)

assembly with eyelet

ORI41910: round, Enduro-compound

ORI41091: round, Sprint-compound

ORI41092: Edge Enduro-compound ORI41093:

Edge Sprint-compound brushes

AVAILABLE SPRINGS

ORI41390: soft, 11-coil, 0.30mm

ORI41391: medium, 10-coil, 0.30mm

ORI41392: medium/hard, 9-coil, 0.30mm

ORI41393: hard, 8-coil, 0.30mm

ORI41386: 10-coil, 0.35mm

ORI41387: 9-coil, 0.35mm



The motor can and magnets are common stock in the Orion and Peak motor lines. The can features vents in the gap between the magnets and in its base; they allow a good airflow when the motor is mounted against a flat plate.

MOTOR CAN. The black motor can used for both types of SV2 motors is very similar to those on the V2 and Core motors. It features diagonal vents between the magnets and four pie-shaped vents in the bottom of the can. The vents allow air circulation even when the motor is mounted against a flat surface. A different can is used on the bushed Pro motors because they feature fixed timing. Their endbells don't have timing rings, so there aren't any ring retainers

punched into the can; instead, they have an endbell that's indexed to a slot in the motor can, and tabs secure the endbell. That fixes the motor timing, and that can be a good for beginners who aren't familiar with adjusting motor timing and want an inexpensive but faster motor; this motor couldn't be more "plug and play." The timing is set to a conservative 6 degrees, and that produces better performance than zero timing, but it still allows safe operation in reverse.

The motor can in the Pro BB version is move typical of a standard modified motor. It accommodates a timing ring and allows quick endbell removal and installation and timing adjustment.

ARMATURE. SV2s use the same armature as those in Team Orion's Orbital modified motors. It features straight-stacked lamis nations with a full crown for maximum torque. The armatures are all balanced. even in the Pro versions, and they feature a unique method of balancing. Typically, you balance armatures that are not epoxy-balanced by drilling material from their crowns. When the armature needs a lot of material removed, the drill holes sometimes go deep into the web of the armature. If the drill holes aren't prop-

The armature is stamped for clear identification, and the unique cutouts in the poles' crowns are for balancing.

erly centered on the web, the crown section of the laminations can separate from the armature and damage the motor. Orion cut material away from the armature using the edge of a circular costs much less.

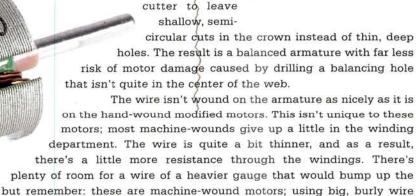
The wire on the Formula

armature is machine-wound. so it isn't as pretty and as tightly wound as the armature on hand-wound highdollar modified motor, but it

circular cuts in the crown instead of thin, deep holes. The result is a balanced armature with far less risk of motor damage caused by drilling a balancing hole

The wire isn't wound on the armature as nicely as it is on the hand-wound modified motors. This isn't unique to these motors; most machine-wounds give up a little in the winding department. The wire is quite a bit thinner, and as a result, there's a little more resistance through the windings. There's

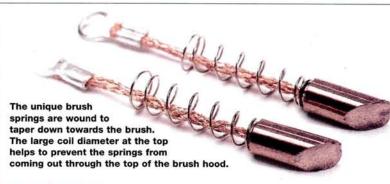
ponies, but remember: these are machine-wound motors; using big, burly wire



DYNOTEST

BRUSHES. SV2 motors come standard with SV2 brush/spring assemblies—Enduro-compound Edge brushes and medium/hard springs. As the name implies, the Enduro-compound brushes last longer than others in the V2 brush lineup. According to Team Orion motor guru Cliff Black, the Edge brush configuration features flat sides instead of being completely round like a standard brush, so Formula motors have a little more punch than they would if they had standard brushes. According to Black, the blunt face of the brushes energizes the segments of the commutator more quickly, and that gives the motor a little extra snap.





BRUSH SPRINGS. Round brush springs are part of what makes the V2 and SV2 motors unique. The springs latch into the triangular brush hoods and apply straight, even pressure on the brushes for more consistent contact with the commutator. I did have trouble with one of the brush springs that didn't want to be installed securely; it kept springing out of the top of the brush hood. As it turned out, its top coil had been wound a little too tightly; a little tweak with needle-nose pliers enlarged the top coil enough to keep it engaged with the brush hood. The angle of the brush hoods makes it harder for the brushes to bounce off the commutator at high speed, so the SV2 uses less spring tension than a conventional brush spring. That could translate into less commutator and brush wear.

OFIND IT

So to page 225 for manufacturers' contact information

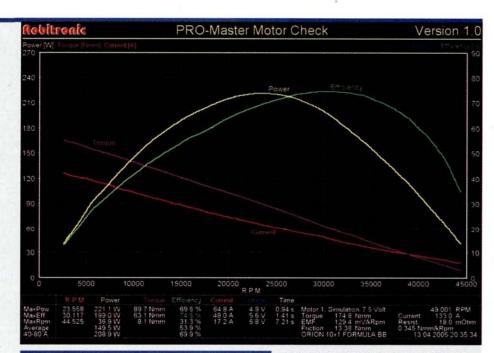
DYNO TESTING

I tested the Formula modified motors on our Robitronic Pro-Master dyno. The dyno is set to a standard 7.5 volts to simulate a 6-cell battery pack; then I run the motors. I allow sufficient time between tests to ensure that the motor is at ambient temperature at the start of each test.

With just a little TLC, Formula motors can be strong. On average, the 10-turn, Pro BB pumped out 185 watts of power; that's strong but not 10-turn strong. I gave the motors a little bit more time to break in, and then I adjusted the timing and applied just a little bearing oil and comm lube. The 10-turn then peaked at 221 watts, and torque shot up by more than 20 percent. Both versions come with a little advanced timing that increases performance, but the Pro BB is fully adjustable.

I turned the 10-turn motor up to about 15 degrees of timing, and that seemed to be the sweet spot for this motor.

Surprisingly, the Pro motors ran as well as or better than the Pro BBs. A 10-turn, double-wind Pro pulled off a pass at just over 225 watts with stronger torque. It just shows that when they're fresh, motors with bushings can run as well as those with ball bearings. Over time, the bearings offer a clear advantage, but there isn't any doubt that you can be fast with a bushing-equipped Formula Pro.



TEST-SETUP SPECS

Wind: 10-turn single Pro-Bearing

Brushes: Edge Enduro-compound brush Springs: medium/hard, 9-coil, 0.30mm

Comm diameter: 0.296 in. (7.52mm)

A little commutator lube and increased timing bump up the power in Formula Pro motors—by about 20 percent in some cases. This 10-turn Formula Pro budget bearing motor produces very good power for a motor of this price. Its power is within just a few percent of a full-blown V2 hand-wound modified's.

DYNO TEST RESULTS

10X1 BB OUT OF THE BOX

Peak rpm: 45.561

Peak power (watts): 185.3 Peak torque (Nmm): 152.6 Torque @ peak power (Nmm): 82.9

Peak efficiency: 69.1%

10X1 BB TUNED

Peak rpm: 49,001

Peak power (watts): 221.1
Peak torque (Nmm): 174.8
Torque @ peak power (Nmm): 89.7

Peak efficiency: 74.5%

13X3 BB TUNED

Peak rpm: 37,854

Peak power (watts): 211.6 Peak torque (Nmm): 209.2

Torque @ peak power (Nmm): 107.4

Peak efficiency: 80.2%

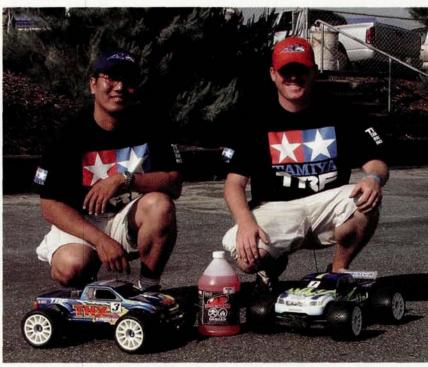
RACER NEWS

LOSI GAS BUGGY!

You read that right! The hot rumor at nitro races this season is that Team Losi is working on a competition-level 's-scale buggy. Team Losi would not confirm or deny the rumor, which leads us to believe that it has something in the works. There's no word on possible features (the silhouetted image is just for style; don't get too excited!), but you can count on Losi to bring something new and different to the class. For proof, just look at what they did in the monster category with the LST.

RHEINARD WINS TOURING MASTERS

Team Orion/Tamiya touring car ace Marc Rheinard has been unstoppable against the world's finest drivers. Rheinard TQ'd and then won the prestigious Touring Car Masters Race held in Eppelheim, Germany, with his signature Orion Revolution motor and Tamiya TRF415 touring car. Rheinard beats the likes of Atsushi Hara, Masami Hirosaka, Surikarn Chaidajsuriya, Teemu Leino and David Spashett to take the win. The final finishing order for the top 5 was Mark Rheinard, Juho Levanen, Jilles Groskamp, Masami Hirosaka and Teemu Leino.



PRO-LINE MAXX CHALLENGE TAMIYA AND LOSI TOP TRUCKS

Small Block winner Jimmy Jacobsen (far right), secondplace David Jun and a pair of fast TNXs.

The 5th Annual Pro-Line Maxx Challenge just went down as we wrapped up this issue, and Tamiya was the big winner in the Small Block Monster Truck class with a one-two finish, thanks to the skills of Jimmy Jacobson (winner) and David Jun (número dos). In Big Block, Team Losi's Adam Drake was the man to beat—but nobody beat him, so score one for the LST. Bobby Tillman took the Outlaw win with his Mugen MRS-5T, and he also kept busy by winning the Buggy class with his MBX-5 Prospec. Meanwhile, Associated's Jared Tebo added another trophy to his shelf with the 2WD Nitro Truck win. That must be some heavy-duty shelf.



Jammin' Jay on the podium? Is this a time warp? Nah, it's 2005 all right, and that's Jay with his winning Jammin' XR-CRT

ROAR GAS NATS MONSTERS DEBUT WITH WINS FOR OFNA, KYOSHO AND ASSOCIATED

Gears R/C hosted the ROAR Off-Road Fuel Nationals in Harlingen, TX, and for the first time, monster trucks were officially recognized as a class. Jason Ashton pulled into an early lead driving a Mugen MRS 5-T, but suffered mechanical troubles that let Jay Halsey move in for the win with his prototype OFNA Jammin' XR-CRT truggy. In 2WD Truck, Associated's Jared Tebo took a page from the Losi playbook and outfitted his truck with custom quick-change hubs machined by his dad, and went on to win the top spot with his GT. Team Kyosho's Mark Pavidis and Trinity/Kyosho driver Ryan Cavalieri battled for almost the entire Buggy A-main. With only two laps to go, Cavalieri jumped over Pavidis's MP-777 for the lead and eventual win.

RACER NEWS

ROAR CARPET OVAL NATS

Halo Hobbies in Toledo, OH, hosted the ROAR 2005 Carpet Oval Nationals for the left-turn-only crowd. When the tire-traction-compound haze had settled and the final groove had been laid into the carpet, seven new national champions were crowned. Tom Postalwait took the ½2 Stock and ½2 19-Turn Modified titles, and Corey Heft won ½0 19-Turn Modified. Arnie Fie was the ½0 Mod champ, Chris Ulbrik left with the ½0 Stock trophy and Phil Beardshear won the new Brushless class that debuted at this race. Halo Hobbies' owner Josh Cyrul (yes, that Josh Cyrul) won ½2 Mod.



SPASH IS A DAD!

David Spashett and Julie Paddock are the proud parents of Rebecca Amy Spashett. Of all of his RC honors and titles, his proudest title is now "Dad."

Congratulations, David and Julie.

LEMIEUX PACKS A FUTABA PISTOL

Trinity's Paul Lemieux is the latest pro to holster Futaba's flagship 3PK transmitter. He joins top guns Mark Pavidis, Jared Tebo and Billy Easton who were signed by Futaba earlier in the year. Looks as if we'll be seeing fewer M8s in the race-coverage winners' charts.

PACEDS, BIGES

Richard Trujillo >> 95.5 Toyota Tacoma

Richard's 95.5 Tacoma is nothing like it used to be when he first owned the truck in 1995. It was Rich's daily driver until his dad showed interest in it and bought it for his body shop, Bodyworks Collision Center. He repainted it



with ghost flames (in fact, they're so ghostly that they don't show up in this pic). Rich bought it back and added a 6-inch Fabtech suspension lift, TRD limited-slip 4.88 diffs, Warn locking hubs, Energy suspension and steering bushings, 35-inch Procomp Xtreme tires, 16x8 Eagle aluminum wheels, K&N FIPK air-filter kit, an LC Engineering exhaust header, H.I.D. headlight conversion and an Alpine stereo with Infinity speakers. This Taco is one hopped-up truck!

TORCK WATCH

A.R.C. RACEWAY MURRIETA, CA.

Dan Cole and his son Adam have opened A.R.C. Raceway in Murrieta, CA, and it promises a fresh new style and atmosphere for RC racing.

The 120x120-foot track features a covered drivers' stand, an elevated pit lane and a big red barn for indoor pitting, and there's room for 60 racers. The Coles will host several cash races that will put a lot of dough on the line for the victors, and club racers who finish well don't leave the track empty-handed. Trophies and "race

bucks" will be awarded each week to the top finishers. If you are interested in racing at A.R.C., you'll want to know that Losi IFMAR Pins and Pro-Line Hole Shots are the hot setups for ½10-scale in wet and dry conditions. In ½8-scale, Pro-Line Knuckles 2.0 are dialed when it's dry, and Pro-Line Crime Fighters work when it's wet. Monster truckers will probably want a set of standard or 40-Series Bow Ties. For more info, contact A.R.C. (951) 304-0580; 41450 Los Alamos Rd, Murrieta CA, 92562. ■







under construction.

There's plenty.

To submit your track to "Track Watch," email 300dpi TIFF or JPEG images and a description to racernews@airage.com.

GOT A STORY FOR RACER NEWS? Contact Jason Sams at jasons@airage.com.

Chris Tosolini's orally

RACE: ROAR ON-ROAD CARPET NATS WINNER

RACE GEAR

Transmitter Airtronics M8 Receiver LRP Phaser Servo Airtronics 94360 ESC Corally VFS-1 **Battery** Pole Position Motor Team Brood 7x1 Motor brushes Reedy Quasar Motor springs Team Orion red Timing 12 deg. Tires (F/R) Parma Double Pink/Orange Traction compound Paragon Body Parma Alfa Paint Frank's Bodies Gearing 17/78

		\
SETUP	FRONT	REAR
Camber	2 deg. negative	2 deg. negative
Caster/anti-squat	4 deg.	0
Toe-in	0	2 deg.
Downstops	7mm	7mm
Ride height	5mm	5mm
Kick-up	0	*
Width	190mm	190mm
Steering block	Plastic	*:
Shims under couplers	2.5/2.5	121
Wheelbase	Middle	Middle
Ackerman	Outside/outside	(4)
Wishbone	75%	75%
Shock tower	Lowered	Stock
Shock oil	60WT	40WT
Shock piston	1.3mm	1.3mm
Shock spring	33 lb.	24 lb.
Shock mounting (tower)	2nd hole in from outside	Outside hole
Shock mounting (suspension arm)	2nd hole in from outside	Outside hole
Camber ball-stud mount (tower)	Upper outside hole	Upper outside hole
Camber ball-stud mount (carrier)	•	Lower middle
Anti-roll bar	None	None
Diffs	Ball	Ball

FACTORY AND AFTERMARKET OPTIONS Corally

4mm chassis

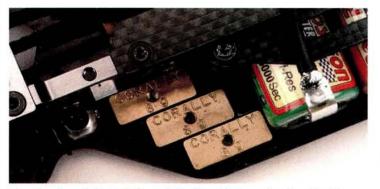
3.5mm top deck



A Team Brood 7-turn single motor kept Chris's RDX up front during the qualifiers and Mains. That's a Corally VFS-1 speed control buried under the giant power capacitor (same as the KO VFS-1 and only available in the Netherlands). Check out the huge diode on the motor.



Chris uses the optional 4mm chassis for racing on carpet. As you can see, he beveled the edges to prevent it from scraping on the carpet during cornering. Chris doesn't want to lose even a millisecond of speed.

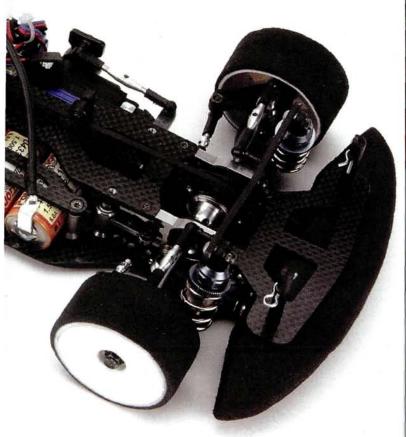


The chassis weights look like gold bullion. Chris used quite a few to bring his RDX up to the legal weight and to help balance it. They are keyed to the chassis, and there are dozens of places to mount the weights. Sweet.



Go to page 225 for

So to page 225 for manufacturers' contact information



Factory Driver HOT MOD

drivers.

Although it's difficult to spot, Chris applies CA around the outer edges of the wheels and on the tires' sidewalls to improve the tires' bond. It prevents chunking, makes the wheel more rigid and also takes away a little traction in the corners (this prevents rollovers).

This trick is used by many pro

QUESTIONS

DRIVER: CHRIS TOSOLINI

AGE: 27

LAST BIG WIN: ROAR ON-ROAD CARPET NATS
SPONSORS: CORALLY, TEAM BROOD, AIRTRONICS,
POLE POSITION BATTERIES, HUDY, KYOSHO, PARMA
AND FRANK'S BODIES.



WHEN I'M NOT RACING I LIKE TO: HANG OUT WITH FRIENDS AND WORK ON MY CAR.

RC CAR ACTION: You were racing against the best of the best at the Carpet Nats. What made all the pieces come together for you at this race?

CHRIS TOSOLINI: This was kind of like the season-ending race. Fortunately, I had enough practice with the new car and was familiar with setting it up. My sponsors helped a lot, too. I didn't have the sponsorship help earlier in the season, but I had full support at the Nats. The chassis is very

consistent from one run to the next, and that helps so much. There's nothing worse than having to make major adjustments after each run.

RCCA: After setting the TQ, were you confident that you could win the Mains? Were there any drivers who you felt could pull off an upset?

CT: Yes, I was very confident. Mike Blackstock was by far the fastest driver at the Nats. It all came down to who crashed and who didn't. Luckily, I did not crash during the main: Mike did.

RCCA: The Corally RDX looks like a sweet ride, and you're obviously fast with it. How do you like the car?

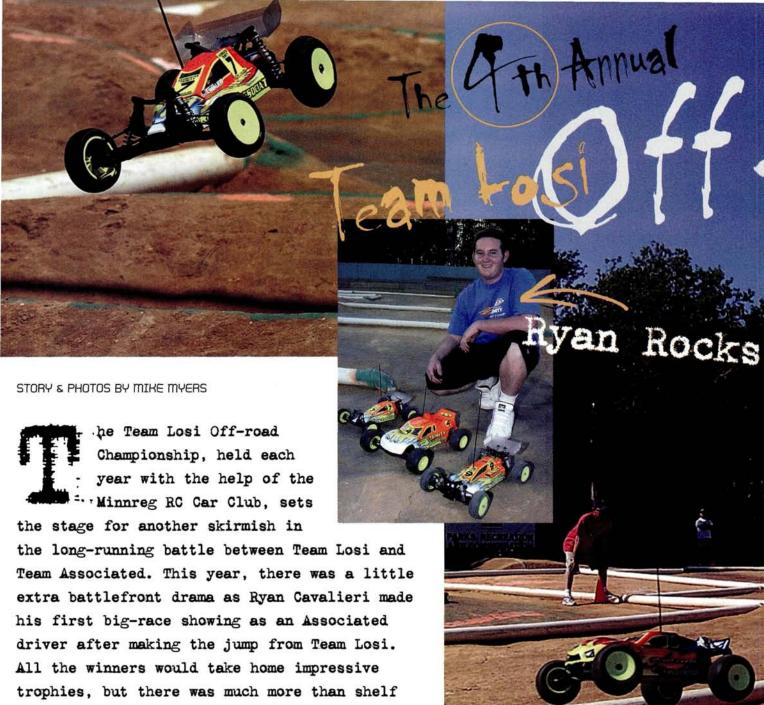
CT: Once the car is dialed in, it's very consistent from one race to the next. I also like that the drivetrain is positioned really low and that it spins super-free. I also like the tuning capabilities; this car has more adjustments than any I've driven before. The only thing I don't like is that adjusting roll center is kind of a hassle. Fortunately, there are only two options; carpet and asphalt, so you rarely need to make that adjustment.

RCCA: You're also one heck of a nitro on-road racer. Which do you prefer—nitro or electric?

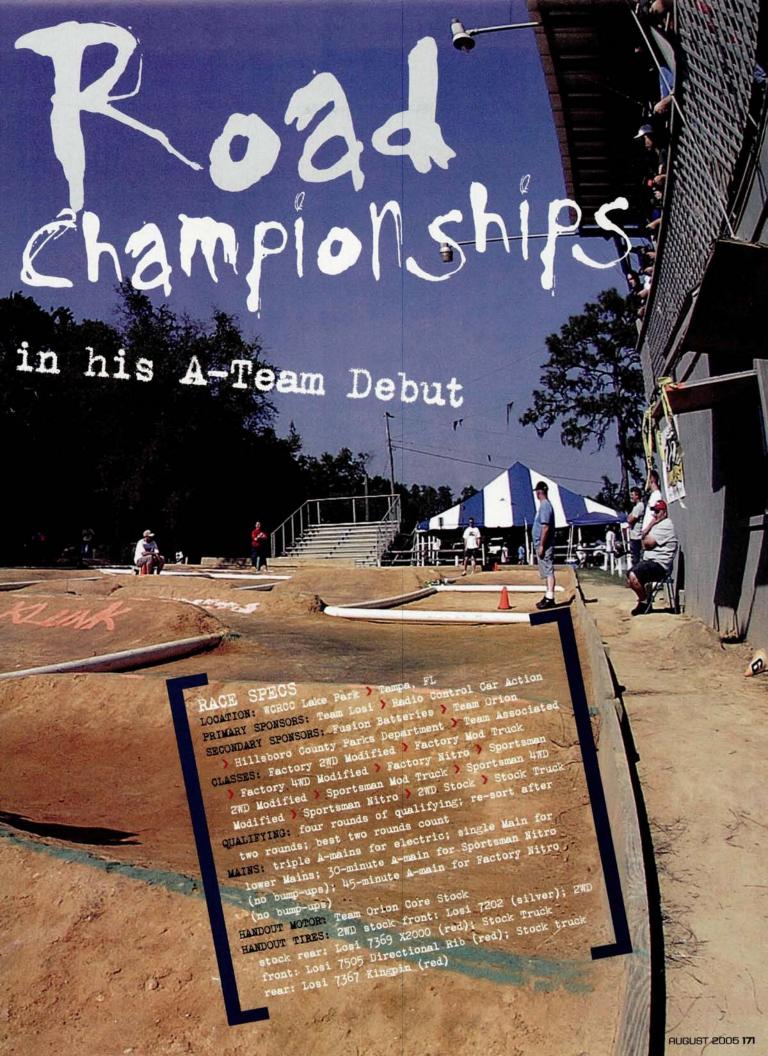
CT: I like nitro because you don't have to worry about your batteries dumping. You can run out of fuel in a race, but you have to be a bonehead to do that. I also like the longer Mains; no need to get aggressive early on, and a car's setup is almost as important as driving skill.

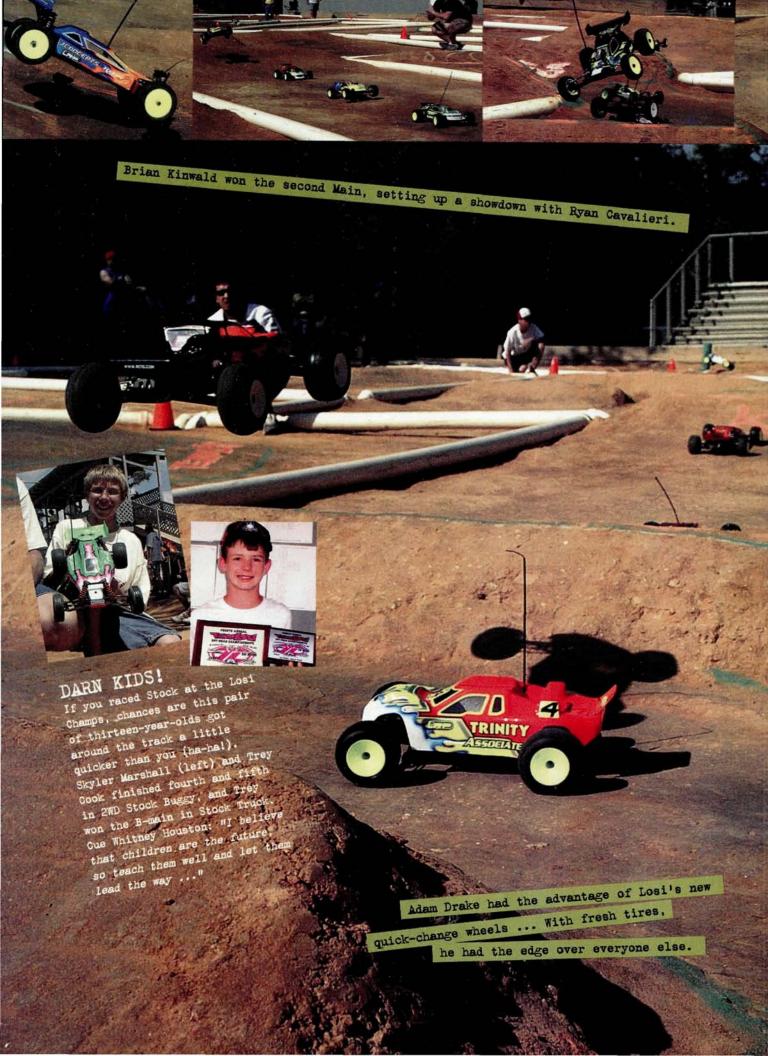
RCCA: If you had to stick to one racing class, which would it be?

CT: I would choose 1/8-scale on-road if I could only race in one class. There are so many more critical factors involved in 1/8-scale racing, and the cars are so fast. They truly are the F1 cars of RC. ■



hardware on the line!







RACE CLASSES

Factory 2WD Modified

TO: Ryan Cavalieri

Associated B4 > Trinity power

Winner: Ryan Cavalieri

Ryan's Trinity-powered Associated B4 was unstoppable in two-wheel and posted back-to-back wins in the first two A-mains to take the overall. This left the final Main to decide the second-place and lower finishers, which included Travis Amezcua, Matt Francis and Jared Tebo (in that order).

Factory Mod Truck

TO: Ryan Cavalieri

Associated T4 > Trinity power

Winner: Ryan Cavalieri

Ryan Cavalieri won the first of the triple A-mains with his T4, but Team Losi's Brian Kinwald won the second Main to set up a showdown between him and Ryan. In the third and deciding race, Ryan was flawless and put together the deciding win.

Factory 4WD Modified

TQ: Ryan Cavalieri

) J Concepts BJ4) Trinity power

Winner: Ryan Cavalieri

Another first-round win for Ryan (this time piloting a J-Concepts BJ4), but Losi's Travis Amezcua won the second round. In the third, Ryan again dominated the race and took the overall win. Score three big wins in a row for Ryan!

Factory Nitro

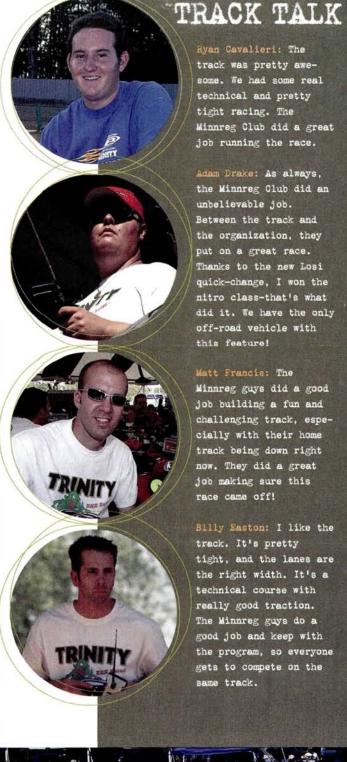
TO: Ryan Cavalieri

> Associated GT > Sirio engine

Winner: Adam Drake

Team Losi AD2 Sirio engine

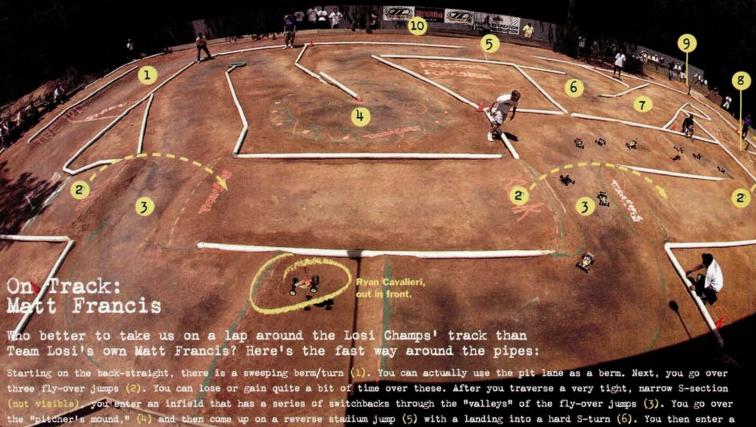
Had this been a 5-minute Main, Ryan would have had a clean sweep. He was clearly the fastest racer in this class, but as the racers' tires wore down during the 45-minute Main, Adam Drake exploited his Triple-XNT's quick-change wheels. His pit crew made two lightning-fast tire changes during the race. With fresh rubber, Adam had an edge over everyone else and went on to win.



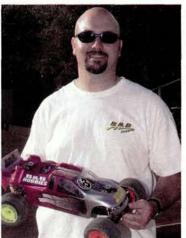
BACK STONY

The biggest story at the Losi Champs was the track itself. Because the Minnreg Club's track and facilities were being renovated to comply with county zoning regulations, the club hosted this race at the West Coast RC Car Club's track in Tampa, FL. The dry, dusty track required a lot of work to get it firm and hard. The crew added calcium chloride to the soil to absord moisture and prevent the driving line from drying out and turning into powder, and the club provided constant track maintenance. "Over and under" flyover jump sections have become signature features of the Losi Championship, and this year's larger track accomodated three of them.





three fly-over jumps (2). You can lose or gain quite a bit of time over these. After you traverse a very tight, narrow S-section (not visible) you enter an infield that has a series of switchbacks through the "valleys" of the fly-over jumps (3). You go over the "nitcher's mound," (4) and then come up on a reverse stadium jump (5) with a landing into a hard S-turn (6). You then enter a rhythm section (7) followed by double-doubles, and then you're into the "Death Star" (8). This is the hardest section of the track; you come out into the tabletop (9) before the straightaway and then down the straight (10). I like the layout: it's a good long track with 32-second lap times.



Bald Is Beautiful

Nathan Wincek of New Port Richey, FL TQ'd and won first place in the 30-minute Sportsman Ntro Truck Amain, finishing on bald tires. He did all this with a Losi truck he borrowed from Dave Webb, the owner of B&B Hobbies only two weeks before the race. As the winner of this class, Nathan won a brand-new Triple-XNT from Team Losi!

Even if you finished dead last in the Z-main, you still wouldn't be the slowest on (or under) the Losi Champs track.

There is a tunnel



under the back straightaway, and much of the time, this turtle sits just outside, taking in the sun. I didn't get close enough to measure it (which would have also been close enough to lose a finger), but I'd say the turtle is well over a foot wide.



Adam Drake gives props to his quick-change hub setup. The truck is sitting on the stack of tires he used up in the Main (either that, or it's the world's worst car stand).

Drake Makes a Quick Change

Adam Drake's big win in the Factory Nitro class might not have happened were it not for his Triple-XNT Adam Drake 2's quick-change rear hubs. In the beginning, Ryan Cavalieri led the 45-minute Gas A-main, but as his tires wore down, his lap times increased. Adam made two stops for tire changes during the race, and with fresh rubber, he completely dominated the latter part of the race. According to Adam, quick-change wheels are typically used for making quick and easy tire changes to see which type works best, but on an abrasive track, they allow you to change tires quickly and as often as necessary. It sure worked for him at the Losi Champs.



Note Billy Easton's dual Futaba CDR-5000 chargers; he's sponsored by Futaba now. Kinwald's Competition Electronics rig is custom painted in Brian's colors, and if you look closely, you can see he's working on his slipper clutch. Elsewhere, Matt Francis rests in a hatchback while Gregg Hodapp bugs him about something, and Mike Truhe glues up new rubber while working a Mountain Dew. There's also a girl in a blue shirt who is probably asking her boyfriend just how much longer this is all going to take.

FACTORY		MOD	TT	TED
Fin Qual	Driver			C

Fin.	Qual.	Driver	Chassis	Motor	Battery	Speed Control	Tires	Body	Radio
1	1	Ryan Cavalieri	Associated	Trinity	Trinity	LRP	Pro-Line	J Concepts	Airtronics M8
2	3	Travis Amezcua	Team Losi	Trinity	Trinity	LRP	Team Losi	Team Losi	Airtronics M8
3	4	Matt Francis	Team Losi	Trinity	Trinity	LRP	Team Losi	Team Losi	Airtronics M8
4	6	Jared Tebo	Associated	Checkpoint	Checkpoint	LRP	INS	J Concepts	Futaba 3PK
5	10	Brian Handwork	Associated	Reedy	Reedy	LRP	Pro-Line	Associated	Airtronics M8
6	5	Brian Kinwald	Team Losi	Trinity	Trinity	Novak	Team Losi	Team Losi	Airtronics M8
7	2	Jesse Robbers	Team Losi	Fantom	SMC	Novak	Team Losi	Team Losi	INS
В	8	J.R. Mitch	Associated	Reedy	Reedy	Novak	Pro-Line	J Concepts	Airtronics M8
9	9	Brent Thielke	Associated	Reedy	Reedy	LRP	Team Losi	Associated	Airtronics M8
10	7	Mike Truhe	Team Losi	Trinity	Trinity	Novak	Team Losi	Team Losi	Airtronics M8
FAC	TORY	MOD TRUCK							
1	1	Ryan Cavalieri	Associated	Trinity	Trinity	LRP	Pro-Line	J Concepts	Airtronics M8
2	2	Brian Kinwald	Team Losi	Trinity	Trinity	Novak	Team Losi	Team Losi	Airtronics M8
3	3	Travis Amezcua	Team Losi	Trinity	Trinity	LRP	Team Losi	Team Losi	Airtronics M8
4	9	Jared Tebo	Associated	Checkpoint	Checkpoint	LRP	INS	J Concepts	Futaba 3PK
5	6	Jason Ruona	Associated	Reedy	Reedy	LRP	Pro-Line	J Concepts	Airtronics M8
3	4	Matt Francis	Team Losi	Trinity	Trinity	LRP	Team Losi	Team Losi	Airtronics M8
7	10	J.R. Mitch	Associated	Reedy	Reedy	Novak	Pro-Line	J Concept	Airtronics M8
3	8	Brian Handwork	Associated	Reedy	Reedy	LRP	Pro-Line	Associated	Airtronics M8
9	5	Billy Easton	Team Losi	Trinity	Trinity	Novak	Team Losi	Team Losi	Futaba 3PK
10	7	Brent Thielke	Associated	Reedy	Reedy	LRP	Team Losi	Associated	Airtronics M8
FAC	TORY	4WD MODIFIE	ED						
1	1	Ryan Cavalieri	J Concepts	Trinity	Trinity	LRP	Pro-Line	J Concepts	Airtronics M8
2	2	Travis Amezcua	Team Losi	Trinity	Trinity	LRP	Team Losi	Team Losi	Airtronics M8
3	4	Adam Drake	Team Losi	Trinity	Trinity	Novak	Team Losi	Team Losi	Airtronics M8
4	6	MikeTruhe	Team Losi	Trinity	Trinity	Novak	Team Losi	Team Losi	Airtronics M8
5	8	Jason Ruona	J Concepts	Reedy	Reedy	LRP	Pro-Line	J Concepts	Airtronics M8
3	3	Matt Francis	Team Losi	Trinity	Trinity	LRP	Team Losi	Team Losi	Airtronics M8
7	7	J.R. Mitch	J Concepts	Reedy	Reedy	Novak	Pro-Line	J Concepts	Airtronics M8
3	5	Jesse Robbers	Team Losi	Fantom	SMC	Novak	Team Losi	Team Losi	INS
9	10	Gregg Hodapp	X5 Losi conversion	Peak	Peak	LRP	Team Losi	X Factory	Airtronics M8
10	9	Brandon Hershey	J Concepts	Reedy	Reedy	LRP	Pro-Line	J Concepts	Airtronics M8

FACTORY NITRO

Fin.	Qual.	Driver	Chassis	Engine	Fuel	Pipe	Tires	Body	Radio
1	2	Adam Drake	Team Losi	Sirio	Trinity	Losi Drake	Team Losi	Team Losi	Airtronics M8
2	3	Jared Tebo	Associated	O'Donnell	O'Donnell	O'Donnell	INS	J Concepts	Futaba 3PK
3	1	Ryan Cavalieri	Associated	Sirio	Trinity	Associated	Pro-Line	Pro-Line	Airtronics M8
4	7	J.R. Mitch	Associated	GS Hobby	Sidewinder	Associated	Pro-Line	J Concepts	Airtronics M8
5	6	Ryan Eckert	Associated	O.S. Engines	Sidewinder	Associated	Pro-Line	Pro-Line	Airtronics M8
6	4	Jesse Robbers	Team Losi	Fantom	Fantom	Losi Drake	Team Losi	Team Losi	INS
7	8	Leon McIntosh	Associated	O.S. Engines	Sidewinder	Associated	Pro-Line	J Concepts	Airtronics M8
8	5	Allen Horne	Associated	O'Donnell	O'Donnell	Associated	Pro-Line	Pro-Line	INS
9	10	Mike Truhe	Team Losi	Rossi	Trinity	Losi Drake	Team Losi	Team Losi	Airtronics M8
10	9	Jim Meyers	Losi Triple	O.S. Engines	Maxys	Losi Drake	Team Losi	J Concepts	JR XS3 Pro

INS=INFORMATION NOT SUPPLIED BY DRIVER



STORY & PHOTOS BY JASON SAMS

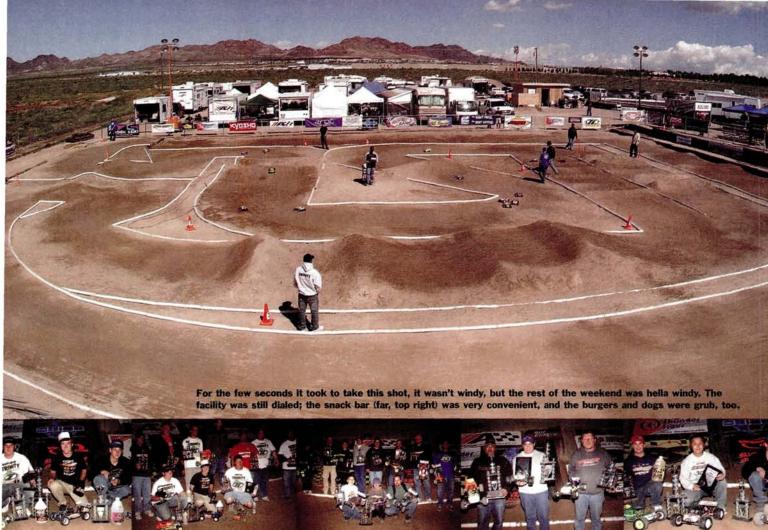
importance. It's typically held after the Nitro Challenge and just
before the Nationals—the "Super Bowl" for American racers. Racers can
gauge their speed against the very best in the U.S., and that is
evident when several top sponsored racers battle in the D-main. The tracks tend
to be huge and technical, and the weather is usually hot and dusty with 30mphplus winds—enough to make even hardened cowboys whine. Hosted by Boulder City
Raceway, this year's Challenge was no exception. The track layout was tough;
racers had to negotiate a path through the sketchy back straightaway that was
more like a rutted minefield. Check out the shots from this year's racing party
that went down just outside Sin City.



Above: the pit lane was wicked crowded during the ½10-scale A-main, but that didn't prevent Bruce Tebo from having NASCARfast pit stops.

Left: Paul Coleman's Hyper 7 out-jumps No. 14's Thunder Tiger S3.

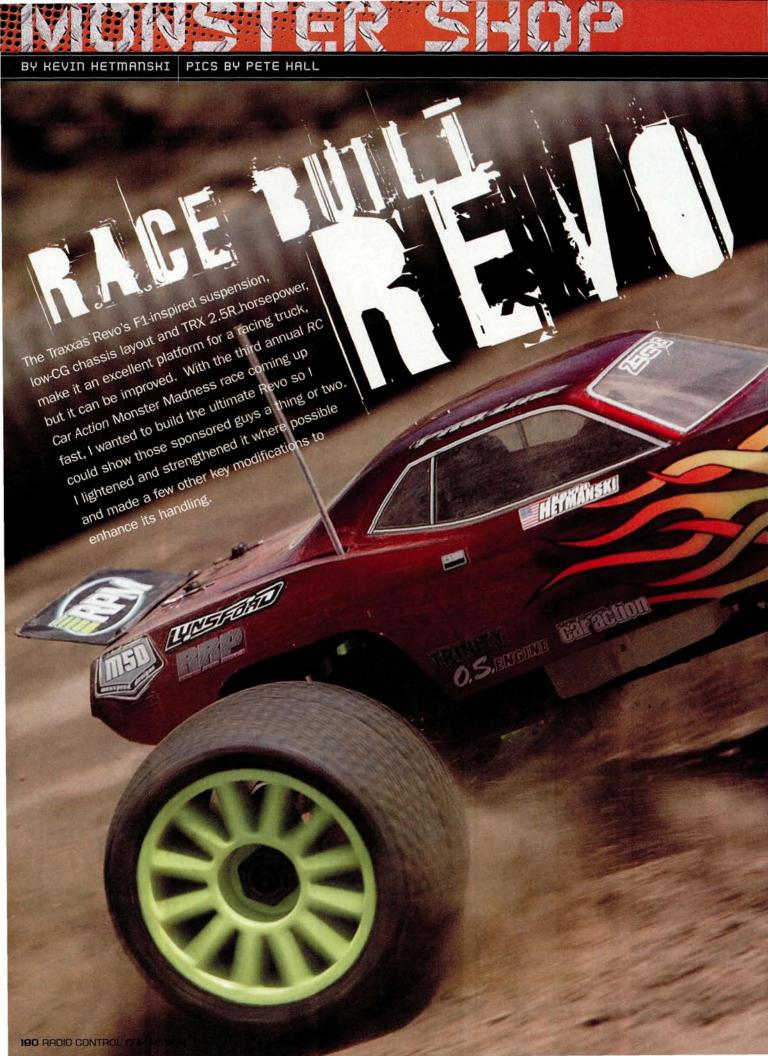




Sportsman Buggy Pro Truck Sportsman Truck **Unlimited Monster Truck Pro Buggy**

IN		GY DRIVER	CHASSIS	ENGINE	FUEL	TIRES	RECEIVER PACK	RADIO
1	14	Jared Tebo	Kyosho MP 777	RB/O'Donnell	O'Donnell	Treadz	HT Batteries	Futaba 3K
2	3	Ryan Cavalieri	Kyosho MP 777	Trinity/Sirio	Trinity	Pro-Line	Trinity	Airtronics M8
3	5	Bobby Tillman	Mugen MBX5 Pro-Spec	Mugen	Mugen	Pro-Line	Team Orion	Airtronics M8
4	8	Chad Bradley	Mugen MBX5 Pro-Spec	JP Modified	Mugen	Pro-Line	Mugen	Airtronics M8
5	4	Jeremy Kortz	Kyosho MP 777	Werks Racing	O'Donnell	Pro-Line	HT Batteries	Airtronics M8
PRO	TRU	CK						
1	2	Jared Tebo	Associated FTGT	O'Donnell	O'Donnell	Pro-Line	Reedy	Futaba 3PK
2	3	Ryan Cavalieri	Team Losi AD2	Trinity/Sirio	Trinity	Losi	Trinity	Airtronics M8
3	1	Adam Drake	Team Losi AD2	Trinity/Sirio	Trinity	Losi	Trinity	Airtronics M8
4	7	Billy Easton	Team Losi AD2	Trinity/Sirio	Trinity	Pro-Line/Losi	Trinity	Futaba 3PK
5	11	Phillip Atondo	Team Losi AD2	Team Orion Wasp	Team Orion	Losi	Team Orion	Airtronics M8
SPO	RTSM	AN BUGGY						
1	14	Greg McGlothlin	Mugen MBX5	Top P5	O'Donnell	Pro-Line	OFNA	Airtronics M8
2	2	Robbie Damico	Kyosho Kanai 2	Top P5	O'Donnell	Panther	Ballistic	Futaba 3PK
3	3	Jason Sams	Kyosho MP 777	Crono/Fusion	Team Orion	Pro-Line	Team Orion	Airtronics M8
4	1	Levi Jackson	Kyosho MP 777	O.S. V-Spec	O'Donnell	Pro-Line	JR	JR XS-3
5	9	Jay Krug	Mugen MBX5	Medial Pro M2K	O'Donnell	Pro-Line	Mugen	Futaba 3PK
ano:	n av	AN MOTOR						
SPO. 1	RTSM.	AN TRUCK Danny Greco	Associated GT	Team Orion Wasp	O'Donnell	Pro-Line	Trinity	Airtronics M8
	12	Paul Somarriba	Team Losi AD2	INS	INS	INS	INS	INS
2	-	Manager Property of the Control of t		DANGE COLUMN		Pro-Line	Airtronics	Airtronics M8
	8	Rill Harry	Team Losi AD2	Novarossi	O'Donnell			
3	8	Bill Harry	Team Losi AD2 Associated FT GT	Novarossi Team Orion Wash	O'Donnell			
3 4	8 2 14	Bill Harry Levi Jackson Billy Patterson	Associated FT GT Associated FT GT	Novarossi Team Orion Wasp Mugen MT 12	O'Donnell Racers Edge	Pro-Line Losi	JR Airtronics	JR XS-3
3 4 5	2 14	Levi Jackson Billy Patterson	Associated FT GT Associated FT GT	Team Orion Wasp	O'Donnell	Pro-Line	JR	JR XS-3
3 4 5	2 14 IMIT	Levi Jackson Billy Patterson ED MONSTER	Associated FT GT Associated FT GT TRUCK	Team Orion Wasp Mugen MT 12	O'Donnell Racers Edge	Pro-Line Losi	JR Airtronics	JR XS-3 Airtronics M8
3 4 5 UNL 1	2 14 IMIT. 1	Levi Jackson Billy Patterson ED MONSTER Atsushi Hara	Associated FT GT Associated FT GT TRUCK Hot Bodies Lightning Pro	Team Orion Wasp Mugen MT 12 O.S. V-Spec	O'Donnell Racers Edge Team Orion	Pro-Line Losi Pro-Line	JR Airtronics Team Orion	JR XS-3 Airtronics M8
3 4 5 UNL 1 2	2 14 IMIT. 1 4	Levi Jackson Billy Patterson ED MONSTER Atsushi Hara Matt Gosch	Associated FT GT Associated FT GT TRUCK Hot Bodies Lightning Pro INS	Team Orion Wasp Mugen MT 12 O.S. V-Spec Werks/Collari	O'Donnell Racers Edge Team Orion Byron	Pro-Line Pro-Line Pro-Line	JR Airtronics Team Orion INS	JR XS-3 Airtronics M8 KO Propo Airtronics M8
3 4 5 UNL 1 2 3	2 14 IMIT 1 4 9	Levi Jackson Billy Patterson ED MONSTER Atsushi Hara Matt Gosch Bobby Tillman	Associated FT GT Associated FT GT TRUCK Hot Bodies Lightning Pro INS Mugen MSR X5T	Team Orion Wasp Mugen MT 12 O.S. V-Spec Werks/Collari JP Modified	O'Donnell Racers Edge Team Orion Byron Mugen	Pro-Line Pro-Line Pro-Line Pro-Line	JR Airtronics Team Orion INS Team Orion	JR XS-3 Airtronics M8 KO Propo Airtronics M8 Airtronics M8
4 5 UNL 1 2	2 14 IMIT. 1 4	Levi Jackson Billy Patterson ED MONSTER Atsushi Hara Matt Gosch	Associated FT GT Associated FT GT TRUCK Hot Bodies Lightning Pro INS	Team Orion Wasp Mugen MT 12 O.S. V-Spec Werks/Collari	O'Donnell Racers Edge Team Orion Byron	Pro-Line Pro-Line Pro-Line	JR Airtronics Team Orion INS	JR XS-3 Airtronics M8 KO Propo Airtronics M8

Chad Bradley INS= INFORMATION NOT SUPPLIED BY DRIVER





PARTS

>>> Revo-item no. 5310, \$470

CHASSIS

New Era

>> Stainless-steel screw kit—REV012, \$22

Vantage

>> Revo carbon-fiber chassis-RE0301, \$99

DRIVETRAIN

Robinson Racing

>> Steel spur gear and clutch bell-8040, \$36

>> Forward-only kit-5394X, \$12

TSIAS

- >> T-Bonz driveshafts-TBREV001, \$60
- >> T-Bonz center driveshafts-TBREV002, \$30

SUSPENSION AND STEERING

Lunsford Racing

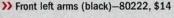
- >> Titanium hingepin kit-3805, \$22
- >> Titanium steering turnbuckles-2805, \$44
- >> Titanium rocker pivot-7606, \$32
- >> Titanium pivot balls-7607, \$35

Traxxas

- >> P2 rockers-5358, \$10
- >> Hard-anodized shock kit—5460X, \$66
- >> Shock spring (orange)—5437, \$6
- >> Shock spring (gold)-5439, \$6
- >> Aluminum hollow ball set-5355X, \$26
- >> Heavy-duty servo-saver spring— 5344X, \$3

RPM

- >>> Rear arms (black)-80192, \$12
- >>> Front right arms (black)-80212, \$14





BODY, WHEELS AND TIRES

>> Plymouth Hemi Cuda body-7181, \$27

Pro-Line Racing

- >> 23mm hex adapter-6034-00, \$16 pair
- >> Wabash 40 HD wheels 23mm-2681-04 \$18/pair
- >> 0 Series Bow Tie tires-1113-00, \$23/pair

ELECTRONICS

Futaba

>> 3PK radio-FUTJ3389, \$310

>> DS8611 steering servo-JRPS8611, \$133

Horizon Hobby

Spektrum 3-channel surface system (Futaba)-SPM1004, \$160

ENGINE AND ACCESSORIES

Kyosho

>> Fuel tank-IF137B, \$25

0.5.

>> .18 TM engine-11931, \$220

RD Racing

>> Revo starter box-REV200, \$130

>> 20% Platinum fuel-MH0020T, \$10

Vantage

>> Carbon-fiber pipe—REI80C, \$65

TOTAL COST \$2,207



CHASSIS MODS

There's no doubt that the stock chassis on the Revo is a work of art, but when I saw a chance to trim 100 grams off the truck by swapping it for Vantage's ultra-trick graphite version, it was a no-brainer. I also removed the rear bumper assembly and cut down the front bumper to save more weight.

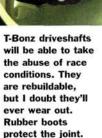
Since the chassis was wide open during reassembly, I rearranged the radio gear. The dual-servo setup was replaced with a single high-torque JR servo, and I moved the receiver pack to the now open servo location. After I removed the stock receiver. I installed the fuel tank and a smaller RPM RC10GT receiver box behind it. I made mounting plates to secure them to the chassis. For the finishing touch, I replaced all of the stock screws on the truck with stainless-steel screws from New Era.

DRIVETRAIN TRICKS

Any truck's spur gear is a vulnerable piece because of the loads put on it by heavy tires, high traction and powerful engines. Robinson Racing's steel replacement spur

> gear will never strip out. It's a bit on the heavy side, but I'll take the extra weight for the added security.

My Revo's main use is racing, and when you race, you don't need reverse. I installed a forward-only conversion kit from Traxxas that allows you to save 61 grams by removing all the reversing gears, the shifter servo and the OptiDrive module. Acceleration is improved, thanks to the transmission's lower rotating mass (I know; you're thinking, "But you added weight with the spur gear!" The setup is still lighter than having a steel spur and reverse-so there).



The stock plastic axles have a lot of backlash that reduces the response of the truck when you get on the gas. I swapped them out for TSAIS T-Bonz hardenedsteel axles. They're rebuildable and use rubber boots to protect the universal joints.

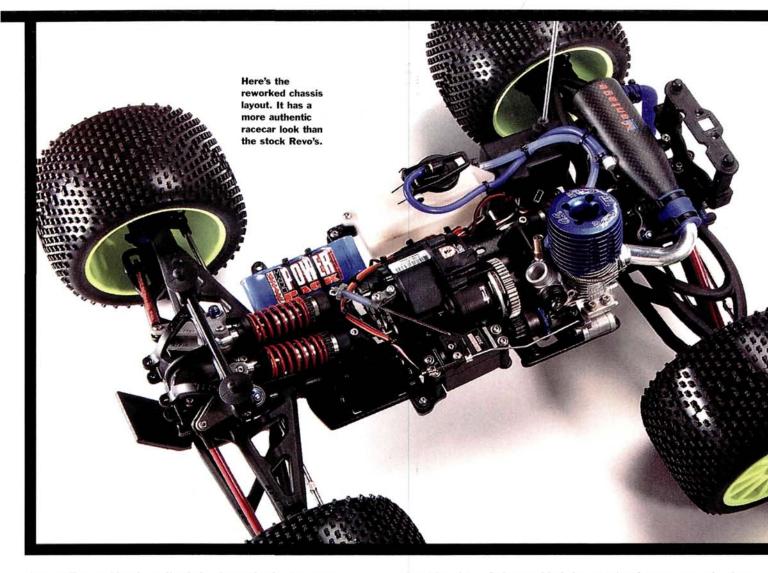
SUSPENSION AND STEERING SETUP

Anyone who owns a Revo knows that the stock suspen-

sion settings are a bit on the spongy side, and that hurts performance on the track. I replaced the stock springs with stiffer orange springs in front and gold springs in the rear, and I fitted

Lunsford titanium hingepins and RPM suspension arms add beef while the Traxxas P2 rockers, aftermarket springs and aluminum shocks enhance the truck's handling.





them to Traxxas' hard-anodized aluminum shocks that come assembled with titanium-nitride-coated shock shafts. They're supersmooth and wear well. I filled them with 50WT shock oil. I swapped out the shock ends for stronger aluminum ones from New Era because they take a beating when the suspension reaches full extension. The shocks and arms are joined by a set of P2 rockers that stiffen the suspension and reduce body roll and brake dive. To further reduce chassis weight and increase strength, I equipped it with Lunsford Racing's titanium hingepins, pivot balls and rocker posts and replaced all the stock steel balls with hard-anodized aluminum units from Traxxas.

Although I didn't expect any trouble from the stock suspension arms, I replaced them with front and rear arms from RPM. They aren't any lighter or heavier than the stock arms, but they are stronger. They're available in black (my choice), blue and

The O.S.

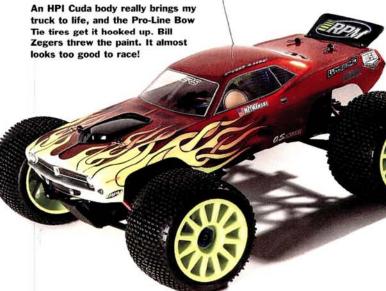
18TM engine comes ready to drop right in. I converted it to a non-pull-start by installing an O.S. TZ backplate and grinding down the nub on the crankshaft.



dyeable white. I also modded the steering for more travel using the steps detailed in the June 2005 issue's "Revo Pro Steering Mods" how-to.

HORSEPOWER

I considered converting the powerful, stock TRX 2.5R engine to bump-start to make it lighter, but more power is always better, so I decided to add an O.S. .18 TM engine. It's designed to fit the Revo





I stuck with the carbon-fiber theme when choosing my tuned pipe. This pipe from Vantage Racing is a direct replacement, and it's constructed out of carbon fiber instead of aluminum.

and accept the EZ-Start system without modification, but since I was out to save weight wherever possible, I converted the engine to bump-start I removed the crankshaft, ground off the small nub that connects the crankshaft to the electric-start shaft and replaced the stock backplate with one from an O.S. .18 TZ. I installed a Vantage carbon-fiber pipe to complete the installation; it's a perfect match for the chassis.

I could use a standard starter box to fire up my engine, but it can be a bit of a pain to line the flywheel up with the starter wheel on the box. RD Racing's Revo-specific starter has a small tab on top that aligns the engine's flywheel with the starter wheel perfectly. Just push down on the engine's head, and you're good to go. Two 550 motors to turn the engine over, a 12V gel-cell provides the power and an external charging jack makes it easy to recharge the battery.

FUEL FLOW

One thing on the Revo that makes me crazy is its fuel tank. Depending on which type of neck your fuel bottle has, filling it up can be difficult. After a little tinkering, I managed to fit a Kyosho MP 777 fuel tank in its place. It holds the same amount of fuel, but it's much easier to fill.

RACE RUBBER

Pro-Line's 40 Series Bow Tie tires are a track favorite and an easy pick for my race truck. I mounted them on Wabash wheels and installed the required 23mm hex adapter. The larger hex spreads wheel loads over a larger area, and the oversize mounting nuts clamp the wheels tightly, so they stay put during long Mains.

ELECTRONICS

The more I used my Futaba 3PK radio, the more fond of it I became, and now that I've installed a Spektrum module, I love it even more. A Hitec HSC-5998TG servo now controls the steering, and the stock Revo servo works the throttle and brake. ■

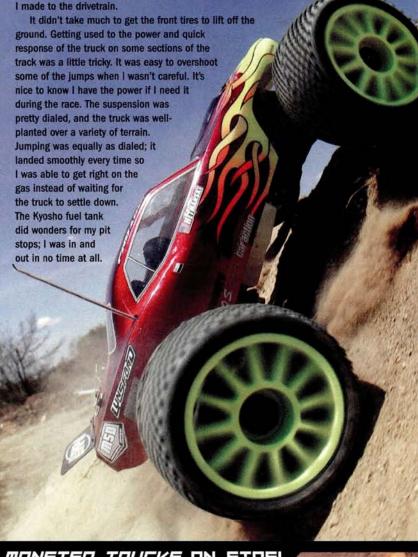


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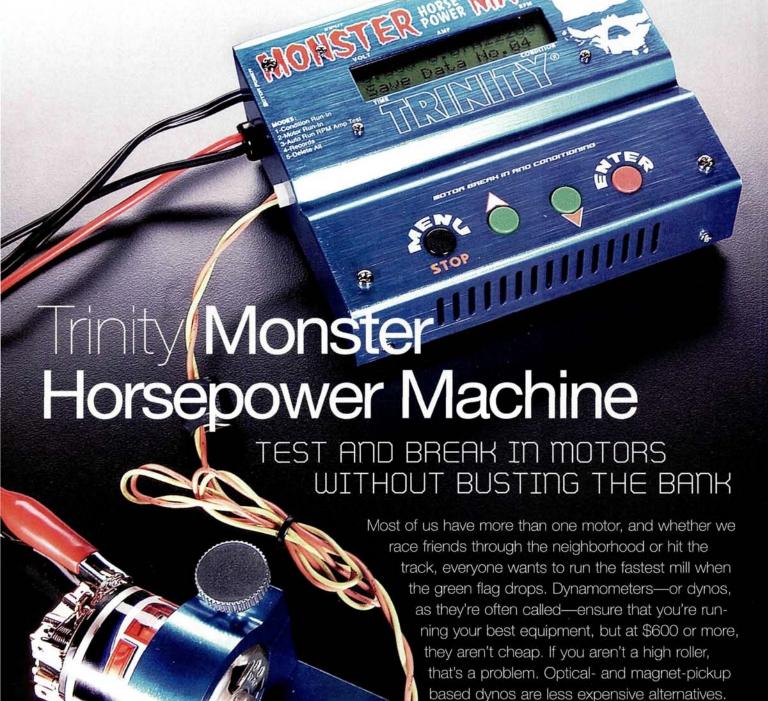
PERFORMANCE

I took my tricked out truck to RC Madness in Enfield, CT, for its first race. Some of the best racers in the state compete there, so I knew that if I placed well, I definitely had a contender for the Monster Madness race. As soon as I got there, I hit the track so I could get the layout and truck figured out before the race began. I placed the truck on the starter box and gave it a push to prime the carb; the flywheel lined up perfectly. The other nice thing about the starter box is that you can leave the truck on it and warm up the engine without wearing the tires. I had someone place the truck on the track while I made my way up to the drivers' stand.

The first thing I noticed was how responsive the steering was; it was better than that of some ½-scale buggies that I have driven. I had no trouble getting the truck around the tight corners that had been laid out for the weekend's race. I was also able to carry a lot more corner speed than I could before I modified my truck. Acceleration is incredible, thanks to the weight I shaved off the truck and the modifications







does all of that and more.

Unlike real dynos, "motor checkers" don't actually test mechanical power, but they are good

for comparing the motors in your arsenal.

They're also useful for assessing which tuning tweaks work, and as a bonus, many perform other functions such as break-in and condition assessment. Trinity's Monster Horsepower Machine

FEATURES

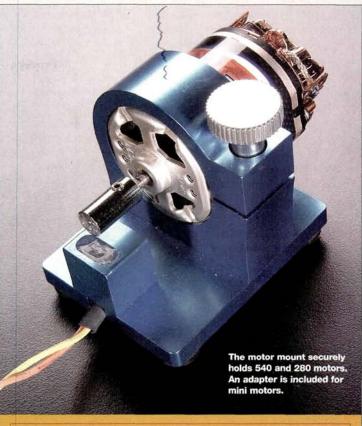
THREE-WAY MOTOR TESTING. The Monster Horsepower Machine tests three parameters: rpm, which is simply how fast the motor spins; amp draw, which is a good barometer for power output; and motor condition, which lets you know whether the brushes are properly seated.

"AUTORUN" MODE. To simulate race conditions, the Machine varies the voltage provided to the motor throughout a run. You can adjust minimum and maximum voltage (0 to 8 volts), pulse length (0 to 5 rating of how long high and low voltages will be maintained), run time (1 to 99 minutes), delay time (1 to 99 minutes between cycles) and the number of cycles (1 to 99).

MOTOR RUN-IN MODE. This feature allows you to maintain a constant voltage (0.01V to 8V) during running. This mode is used for testing and breaking in motors as well as to power accessories such as motor lathes.

CONDITION RUN-IN MODE. This mode automatically runs until the brushes have been broken in to a preprogrammed condition. The condition of the commutator/brushes is indicated by a reference number (1 to 60). The lower the number, the better the contact between the brushes and commutator, and that is gauged by measuring how much fluctuation there is during a run.

SEPARATE MOTOR MOUNT. An aluminum mount with an rpm sensor securely holds 540 and 280 motors and ensures more consistent readings.



MANUFACTURER'S SPECIFICATIONS

- >> Input voltage 11 to 15 DC
- >> Output voltage 0.01 to 8
- Maximum constant amps 10
- >> Peak amps 19
- >> Memory 12 runs
- >>> Price \$160*

 *Varies with dealer

OPERATION

Using the Monster Horsepower Machine is fairly simple; like most of today's RC technology such as chargers and computerized radios, you'll be proficient after you've messed around with it the first few times. The only thing even remotely complicated is the AutoRun mode setup. With a little experimenting, I was able to discover what each setting controlled. The highand low-voltage settings and number of cycles are self-explanatory, but the functions of the "PL," "T" and "D" settings still weren't obvious to me after I read the instructions. I contacted the folks at Trinity, and they confirmed that PL stands for "pulse length." That denotes how long the motor will run at each high- and low-voltage setting. T is the length (in minutes) of each cycle, and D is the length (in minutes) of the delay between cycles. All of the other functions are very easy to use.

TESTING

After I made sure that all of the modes and settings performed as promised, I repeatedly ran two brand-new Epic ROAR-legal stock motors in the motor run-in mode. These motors came with dyno printouts from a Fantom Facts Machine dyno. According to their labels, the motors have comparable power ratings, but one pulls more rpm while the other has more torque. The Monster Horsepower Machine confirmed this. As expected, the high-rpm

In motor run-in mode, the Machine displays voltage, amp draw and rpm on the top row. The run time and condition rating are below that.



oroduct probe

motor consistently spun faster while the torque-producer drew more amps. On its own, this information isn't enough to prove which motor will make for a faster car. There's an old maxim: we don't race dynos, we race cars. Well, we don't race motor checkers, either. Most people believe that a high-rpm motor unconditionally makes for a fast car. The problem is that most race tracks call for the vehicle to accelerate almost constantly. Only track performance will determine which motor is the best for a given car on a given track. Whether using a dyno or a motor checker, don't just pick the motor with the most rpm.

The Monster Horsepower Machine worked as promised and provided consistent results. I also ran a Trinity 8-turn modified motor and a Chameleon 2 19-turn spec motor, and the unit never shut down.

Other motor checkers I've used in the past couldn't handle my best, high-revving stock motors. So, far I have tested more than a dozen motors without any problems. There's more to this blue box than just comparison testing; it was extremely useful for breaking in motors. Some motor manufacturers specify a specific break-in procedure such as Trinity's "two to three volts for 10 minutes" recommendation. With the Monster Horsepower Machine's timer and adjustable voltage, I was able to perform this task exactly as Trinity advises.

Once I figured out how to use the AutoRun mode, it worked as it should, but it didn't seem to be worth the trouble (my opinion may change with time). I liked the condition run-in mode and could see myself using that feature once I've established a base "condition" rating

that reflects a properly broken in motor. To test the condition feature, I swapped out one of the brushes on my broken in motor for an unused, unserrated, almost flat brush. As expected, the condition rating read much higher indicating a poorer brush/comm contact.

The only real complaint I have is that the readings-especially rpm-fluctuated a little too much to aid in fine-tuning. I don't believe it would help you gauge the merit of subtle changes such as minor spring-tension tweaks. The effects of changing a single spring or swapping out a pair altogether is discernable, but the effects of bending a spring slightly weren't picked up in my testing. Because rpm fluctuate, all optical- or magnet-pickup-based motor checkers (as well as all dynos) have this problem, but because of its well-secured motor mount, the Trinity unit offers much more stable readings than those of its competitors.



This is the AutoRun setup screen. The top row shows low- and high-voltage settings as well as pulse length. The bottom row displays the length of each cycle, the delay between cycles and the number of cycles.

VOLT CONDITION CONDITION

Twelve runs can be stored in memory. The record displays the voltage at which the motor was run, amp draw and rom.

LIKES

- Separate mount prevents motors from flopping around.
- >> Simple design is easy to use.
- >> Tests both regular 540 and mini motors.
- >> Includes a nice carrying case, but ...

DISLIKES

- ... the carrying case isn't padded.
- » Legible rpm readout, but it fluctuates.

THE VERDICT

Is the Trinity Monster Horsepower Machine a real dyno? No. Is it a valuable tool that provides useful motor information at a fraction of the price of a real dyno? The answer is "yes." Of the many motor checkers that I've used, this unit is the best so far. It features solid construction, has a sturdy motor mount and is reasonably priced, and it was consistent and accurate enough for my purposes as a club racer. It's also just plain fun to play around with. Now, if you can afford a dyno, by all means buy a dyno, but if you want to compare your motors and properly break them in without busting the bank, the Monster Horsepower Machine is worth checking out. ■



Better nitro living through technology

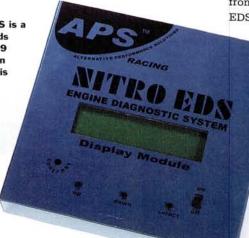
TECHNOLOGICAL ADVANCES CAN BE CREDITED FOR THE EXPLOSION IN THE NITRO MARKET OVER THE PAST FEW YEARS. It has mostly been manifested in improved manufacturing tolerances through CNC machines and CAD programs that make the parts in our engines fit more precisely so they perform better and more consistently. New technology could revolutionize the nitro market and make today's tuning and maintenance routines a thing of the past. This month's "Piston Power" is about technology that's available today, and what it may mean for all of us nitro fanatics in the coming years.

DATA RECORDERS AND TELEMETRY

Data recorders are compact, electronic devices that help you to quantify your vehicle's performance. Many of the adjustments on nitro cars, such as clutch-engagement points, transmission shifts and fuel mixture, are performed mechanically. You can only guess how any adjustment might affect your machine's performance; until you burn through a few tanks of fuel and turn some laps to compare with other test data that you've collected, it's hard to know whether the adjustments are making you faster or slower. Data recorders can log information from many sources simultaneously. For example, you can put a sensor on the engine's flywheel to record engine rpm, a sensor on a transmission shaft for drivetrain speed, a sensor on each output shaft of the differentials to measure individual wheel speeds, a sensor on the engine to monitor cylinder-head temperature and a G-load sensor to monitor handling; servo positions are recorded by wiring them through the data recorder. How does all this help you? Follow the engine rpm curve to the point where the drivetrain starts to move; that's the speed at which your clutch engages. You can observe the differences in output shaft speed to analyze diff performance and determine whether the fluid you've chosen is too thick or too thin. You can also see how the action changes as the diff heats up over the course of a long run. You can combine the diff data with readings from the G-load, throttle and steering position sensors to know how the diff is working as the vehicle enters a corner and as it powers out of it. Instead of just a few

The Nitro EDS from Magma/APS is a simple data recorder that records engine temp and rpm for up to 9 minutes. The display module can be connected while the vehicle is on the workbench for a real-time display.







Eagle Tree Systems brought us the first mainstream RC car data recorder and, now, the Seagull telemetry system. This means you can get real-time performance data from your vehicle on the wireless LCD display.

readings from a temp gun, the temp sensor will give you a complete temperature picture for the entire run. The possibilities are endless; as long as they make a sensor and you can find a place to install it, you can record endless streams of data to help you analyze your vehicle's performance. Eagle Tree Systems brought the sophisticated technology of data recorders from RC airplanes to RC cars. APS/Magma also offers the Nitro EDS, which is a simple, 2-channel data logger that records engine temp and rpm.

Data recorders are great, but you can't view the data while you run your vehicle. It's not much more than a download from the onboard recorder, but the next phase in the evolution of this technology is telemetry. Telemetry offers the ability to transmit data to a remote source. In the case of the Eagle Tree package, that remote source is a hand-held digital display that also has a USB plug to transmit the data to a trackside laptop computer. Now, we not only have the technology to record the data, but we can also view it in real time. A transmitter is placed in the car, and it pumps out the data on the 900MHz band; it has a range of more

PISTONPOWER

than a mile in any direction. It's a little hard to watch the data on the telemetry screen and drive at the same time, but your pit person will be able to keep an eye on the data while it's loading into your computer for analysis later.

What does all this do for you? If you've ever spent a lot of time adjusting some aspect of your car only to discover that you were making the wrong adjustments, this technology was made for you. Of course, it isn't practical to race and watch

the stream of data as it comes from your car, and you can't run in

the "official" races with this stuff installed in your

rig anyway. Data recorders and telemetry will allow you to use the data you collect during practice to tune and tweak your car or

truck in the quickest, most efficient manner. Having all this extra information means you need to know what it to do with it, but once you're able to make sense of the

data, you will be able to make more progress than you could without it.

The most anticipated chapter in the telemetry story is when systems such as the Spektrum DSM begin to incorporate telemetry options to render a separate onboard transmitter obsolete; you simply get the data from the car through the system's existing receiver and transmitter module (actually, a transceiver). To

take it a step further, systems like the Nomadio Sensor incorporate the spread-spectrum technology in the radio itself; if I were a betting man, I'd bet it won't be long before the major radio manufacturers try to introduce their own spread-spectrum systems. These systems have the bandwidth to transmit many streams of data to and from the car and to allow the same types of data as current telemetry systems, but they will also offer the advantage of being able to transmit data back to the car.

The Spektrum 2.4GHz

module and receiver are capa-

tion. We're told that a number

near future, which will provide

of telemetry options are sup-

posed to be available in the

all kinds of real-time data.

ble of two-way communica-

Nomadio, maker of the Sensor, tells us that this exciting new radio may come with a few telemetry sensors as standard equipment, and many optional sensors are planned. Like the Spektrum, the Sensor uses the 2.4GHz band.



FAST-FORWARD THINKING

How can this technology help us in the future? Right now, I plan to install the Eagle Tree telemetry system in a speed-run car and to use the real-time data to help make fuel-mixture adjustments. Exhaust-gas temp, cylinder-head temp and engine rpm sensors will give me all the information I need to make quick and accurate fuel-mixture adjustments on the fly. By using remote fuel-mixture needles originally developed for boats, the data that comes from the telemetry could be used by someone with a second radio to finely tune the fuel-mixture in real time. That would allow me to extract the

maximum performance from the engine without having to pull over dozens of times to tweak the mixture setting.

I also see the potential for developing smart carbs and even fuel injection. The system for my speed-run car outlined above could be fully automated, so an onboard servo could instantly make fuel-mixture adjustments based on data received from exhaust temperature, throttle position and mass-airflow sensors—the same types of sensors as are used on passenger cars. As these sensors get smaller, cheaper and more power-efficient, they become

A full-blown fuel-injection system is well within the grasp of current technology. The power-hungry injectors have to be a little smaller for them to be practical for use in typical RC car engines, but it isn't as far off as you might think. A smaller injector and a method of onboard power generation, such as a mini alternator, would make an injection system a reality. Advances in battery technolo-

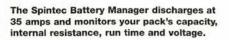
more and more suitable for RC.

True, supercharged RC engines are a reality. O.S. Engines made this FS-120S-SP engine with a crank-driven supercharger. A fuel pump feeds a steady amount of fuel to the carburetor. It may not be long before we see smaller versions of this mean 4-stroke with fuel injection, cleaner emissions and more power.

gy might even eliminate the need for a regenerating onboard power system.

What about 4-stroke engines? Because of their emissions, 2-stroke engines are coming under fire. Granted, our RC engines are such small peanuts that it may be a while before the attention is turned to them, but we may face pressure to run cleaner engines. In addition to the possibility of fuel injection, supercharged, high-output 4-stroke engines could become a reality.

Nobody knows what the next month will bring us—never mind the next year or the next decade. One thing is certain: technology that may directly benefit RC is developing very rapidly. That means there are great things on the horizon for us, and better-running, longer-lasting, lower-maintenance engines are only part of the technological revolution that we're witnessing. Just kick back and enjoy the ride; it only gets better from here.





SPINTEC Battery Manager

If you're a racer, you undoubtedly use bulbs or some other type of discharger to dump your packs. They work, but they aren't "smart." Sure, you could buck up for a competition charger with a big-amp discharge function, but they cost more than a lot of us can afford. Spintec's Battery Manager is the perfect inbetween device. After dumping your pack, this sharp unit displays everything you could want to know about its run time, voltage, capacity and internal resistance. It's only about the size of cell phone, so it can easily be stored in your toolbox, yet it still pulls a full 35 amps.

FEATURES

- Discharges 6- and 7-cell packs.
- "Coolflex" 35A discharge system uses on/off pulses to keep the battery pack cool while it's being discharged.
- "V-sense" cutoff algorithm stops the discharging when the cells reach 0.85 volts to prevent cellreversing.
- Scrolling alphanumeric display.
- All of the previous cycle's details are stored in the unit's memory.
- Overload and reverse-voltage protected.
- 6-month warranty against defects in materials and manufacturing.
- Displays run time, voltage, energy in joules, capacity and internal resistance.

OPERATION

First, attach the alligator clips to your race pack. The Battery Manager will start the discharge after displaying a welcome message and the discharge data from the last pack dumped. After a "3, 2, 1" countdown, the unit starts (if you disconnect the pack before the countdown ends, the previous pack's data will remain in its memory). The pack's voltage and run time are alternately displayed during the early part of the discharge.

After a pack has dumped, the Battery Manager's alphanumeric display reads "End discharge." The display then scrolls through the values for run time (seconds), voltage (volts), energy (joules), capacity (mAh) and internal resistance (ohms) until you disconnect the pack. Each category of information is indicated before the value is given

numerically, and it's held for a few seconds (thankfully, the crucial numbers aren't whisked away before you have time to jot them down). For example, my first pack dumped 3157mAh and had an internal resistance of 56.7 ohms. The Battery Manager read "Capacity" (which scrolls) ... 3157 (which is held) ... "Internal Resistance" ... 56.7 ...

The Battery Manager also allows you to read the previous pack's discharge data repeatedly as long as you don't begin another discharge cycle. To access the data, you have to connect a pack to the unit and then quickly read and jot down the information before the start of the countdown that precedes the discharging of the connected pack.

TESTING

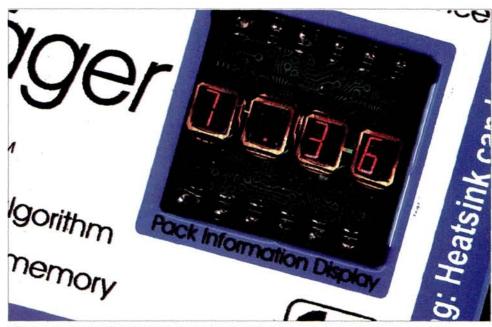
I wanted to accomplish a couple of things when I tested the Battery Manager. First, I wanted to see which of

PRODUCTWATCH

my race packs had the best numbers after a discharge so that I'll be able to use those packs for main events and important qualifiers. Second, I wanted to find out whether discharging with the Battery Manager would, as claimed by its manufacturer, "wake up" my cells and give them extra punch.

I charged my top three race packs (top three according to discharge numbers I had previously recorded), and then I discharged them all with the Battery Manager. Because the unit discharges in microsecond on/off pulses instead of pulling a steady 35 amps, each pack took more than an hour to be completely discharged.

I was concerned about the clicking noises my packs made as they were discharged, but in the instructions, Spintec mentions that they're caused by the "active decrystallization process" and completely normal. Heating is also normal, and the unit does get very hot—too hot to hold, if you're dumping a fully charged pack, so be careful. But your packs will stay cool, and that's important for prolonging their usefulness.



The Battery Manager scrolls text to let you know what data is going to be displayed next. The numeric value is held for a few seconds, so you can record the info for comparative analysis.

motor cool and then strapped in what I thought was my best pack (that is, the one with the lowest internal resistance). I was surprised that the buggy didn't feel any better during the first few minutes, but it didn't seem to taper off as much as the first pack. After about 5 minutes on the track, I noticed only the slightest decrease in punch. This pack was definitely more consistent for the

They did seem to "wake up," and the pack with the highest internal resistance, which also happened to be the lowest in all other categories, didn't drop off as drastically as it had previously. I had thought about retiring this pack to my practice batch, but now I have confidence in it, and I'll use it for club racing.

The clever unit does everything an electric racer wants: it discharges at 35 amps ... without heating the pack, and it displays all the important information you need to rank your packs.

The three packs I tested were fairly close in terms of run times and voltage (as I expected), but there was a noticeable difference between internal resistances. I wanted to do some track testing to see whether the differences would be reflected in their performance on the track. I recharged each pack after recording its data, and then I headed to Hot Rod Hobbies to test them. I ran the pack with the highest internal resistance first and, surprisingly, it initially felt pretty good. After a few minutes, it was noticeably down on punch and was no longer snappy coming out of corners and when hitting the jumps. I let the

same duration than the first. My third pack felt much the same as the second pack and didn't taper off as much as the first one. I discharged the packs again and noticed an improvement in their readings. Internal resistance went down from 64.5 to 47.5 ohms on one pack, and energy was 11 joules higher; this leads me to believe that the Coolflex decrystallization process really works.

Capacity, voltage and run times all var-

Capacity, voltage and run times all varied, and that's understandable because they're directly related to how much charge is left on the pack.

I hit the track again with all three packs, and they all felt a little better.

THE VERDICT

Spintec's Battery Manager is for serious racers who want to know which packs are their best ones and who want to maximize their performance. The clever unit does everything an electric racer wants: it discharges at 35 amps (similar to the load of a low-turn modified motor) without heating the pack, and it displays all the important information you need to rank your packs. The only improvements I can suggest are a cooling fan and a built-in on/off control instead of having to connect and disconnect packs. At \$109, the Battery Manager may be a bit pricey for some, but the advantages of using it will soon outweigh its cost-that is, if you value the top step on the podium!

—Jason Sams

Spintec Battery Manager—item no. SPI1000; \$109

OFING IT

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Airtronics (714) 978-1895; airtronics.net.

APS Racing distributed by Magma Intl. (905) 886-1808; magmarc.com.

Byron Originals (712) 364-3165; byronfuels.com.

Castle Creations (785) 883-4519; castlecreations.com.

CEN Racing (714) 792-1923; cenracing.com.

Core Speedway Competition Racing System corespeedway.com.

DuraTrax distributed by Great Planes Model Distributors (217) 398-6300; (800) 682-8948; duratrax.com.

FlexTek RC (541) 990-7248 flexteckrc.com.

FMA Direct (800) 343-2934; fmadirect.com.

Hard Bodyz distributed by Hobby People (877) 442-9872; hobbypeople.net.

Hardcore Racing Components (661) 294-5032; racinghardcore.com.

Hitec RCD Inc. (858) 748-6948; hitecrcd.com.

Horizon Hobby Inc. (800) 338-4639; horizonhobby.com.

Hot Works Racing distributed by Schumacher USA (813) 889-9691; racing-cars.com; hotworksracing.com.

HPI Racing (949) 753-1099; hpiracing.com.

Iwaver distributed by Hobbico/Great Planes (217) 398-6300; (800) 682-8948; hobbico.com; iwaverusa.com.

KO Propo USA Inc. (310) 532-9355; kopropo.com.

Kyosho Corporation of America (800) 716-4518; kyoshoamerica.com.

LRP distributed by Team Associated.

Much More Racing teammuchmore.com.

Nomadio (215) 854-8432; nomadio.net.

Novak Electronics Inc. (949) 833-8873; teamnovak.com.

OFNA Racing (949) 586-2910; ofna.com.

Out of Control RC Products oocrc.com.

Panther Products Inc. (866) 700-8473; panthertire.com.

Pro-Line (951) 849-9781; pro-lineracing.com.

RC Solutions (480) 609-7233; rc-solutions.com.

RDlogics (310) 217-0908; rdlogics.com.

RPM R/C Products (909) 393-0366; rpmrcproducts.com.

Spektrum distributed by Horizon Hobby Inc.

Sportwerks distributed by Horizon Hobby Inc.

Tamiya America Inc. (800) 826-4922; tamiyausa.com.

Team Associated (714) 850-9342; team associated.com; rc10.com.

Team Tekin teamtekin.com.

Tempgun.com (303) 347-0500; tempgun.com.

TSAIS distributed by RCHub.com (816) 224-2070; tsais.com.

VS Tank vstank.com.

XTM Racing distributed by Global Hobby Distributors (714) 964-0827; xtm.gløbalhobby.com.

XXX-Main Racing (877) 744-6793; xxxmain.com.

Yokomo USA (949) 252-8663; yokomousa.com.



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SWEDE NEED FOR SPEED!

If you follow the World's Fastest RC Car Challenge link to the bulletin boards at rccaraction.com, you'll see some of the wild machines already in the works for the landmark

event. They're all bound to go fast, but one rocket ride stands out for its carefully planned and proven design. It has already topped 111mph! Sweden's Sigurd Ruschkowski (designer and builder) and Bruno Heremans (co-designer) are the men behind the electric super-sled you see here. So ...

how's your car coming?

It looks like a NASA lifting body, but the lozenge shape is carefully designed not to become airborne.

Wind-tunnel testing. Just in case you didn't think these guys were serious enough.



Left: the front suspension uses XRAY and Serpent touring car parts in a custom configuration. Check out those shock springs! Right: the rear suspension basically is a scaledup pan-car design. All the custom fab work is first-



SPECS

Chassis Kevlar and fiberglass, Kevlar honeycomb, Quasiisotrope carbon and fiberglass parts

DIMENSIONS

Length 1,012mm (40 in.)

Width (at widest point) 350mm (13.8 in.)

Height 300mm (11.8 in.)

Frontal area 0.040m²

Weight (RTR) 7.5kg (16.5 lb.)

Air-drag coefficient (Cd) approximately 0.25

POWER

Batteries 32 GP3300 pushed and matched by Hopf Modelltechnik .

Motor Lehner Brushless 22-high-amp, 2250/7,

2280/7 and 2280/8

Speed controls Schulze 32.170 and 32.80 with brake (32 cells, 170 and 80 amps, respectively)

TRANSMISSION

Pinion 1.5 module steel, 12 to 25 teeth Spur FG Modellsport plastic, 40 to 58T Gear ratio 4:1 to 2:1

WHEELS

Front UFRA Foam ½0 scale on Serpent rims
Rear ½ scale Special Soft Type from PMT on FG rims

SUSPENSION

Front Highly modified ½10 scale with parts from XRAY T1 and Serpent 835

Rear Design by Bruno Heremans using a 4mm thick T-bar in fiberglass plate and 2 FG shocks Al7075-T6 and Quasiisotrope carbon plates

